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PETROLEUM.

THE DISCOVERY OF PETROLEUM.

Mr. William W. Hubbell, Scientific, Mechanical and Consulting Engineer, of Philadelphia, sets forth the following theory in his circular, and from which we make the accompanying extract.

This vast treasure of nature, or natural oils, leads the mind to reflect upon the various unexplained discoveries of modern enterprise, and aggregate them to form a conclusion as to its origin, extent, and offices in the great laboratory of nature.

The conclusion of science, in my mind, up to a certain point, are positive; beyond, there are certain ascertained facts which lead me to strongly suspect that a great scientific theory, which I will explain, is true.

The positive facts in regard to Petroleum are, that it is an oleaginous fluid, lighter than water, very penetrative, found in a porous sandstone strata within the earth, which it pervades, and in which it flows, induced in its course by capillary attraction, and coal is generally in the vicinity. The conclusion is inevitable, that it pervades the whole of this sandstone strata; the porous nature of the strata, and the flow of the oil, leave no question on this point.

The next point is undetermined, as to how far, in a north-easterly and south-westerly direction, and northerly direction, this strata extends in a continuous formation. This can only be determined by actual exploration. If this strata extends from the unfrozen or open Polar Sea of this earth to the north-western side of this continent and terminates in the Pacific Ocean, then the theory No. 2, which I shall advance, is true. If this strata does not so extend, then the theory No. 1 is true, and Petroleum is only a local formation or special deposit. My present impression is, that it is not a mere local special deposit, but that it forms a circulating fluid which explains several facts before ascertained, and unexplained by a known theory or laws as to the conditions of the matter of the earth.

THEORY, No. 1. That it is a local deposit, formed and found, and confined, to a limited extent, in a standstone strata or basin, is a very simply conclusion, but is questionable on several grounds. 1st. The Petroleum has an internal pressure or force in its flow, which shows that it is actuated by an original power, or general pervading nature, and this is inconsistent with a mere local deposit. 2d. It is not found generally as a deposit in different parts of the earth, as in the case with iron, and the minerals of gold, silver, copper, and deposits of matter. This shows that it is not a general production of nature, as a local deposit, though it is a natural oil of the earth, and argues against its being considered as a special local deposit. 3d. If it was an exudation from coal, then it could be made from coal. Chemistry has shown that coal oil and Petroleum differ, though I believe the coal was produced by Petroleum, having combined with charred wood and vegetable matter at an early day.

THEORY, No. 2, which I have never heard advanced, until by myself, is, that Petroleum is a vegetable oil, which is produced, in the Pacific Ocean, by the decomposition of sea plants, and, mixed with salt water, it pervades the open Polar Sea discovered by Dr. Kane, and prevents it from freezing, that being lighter than water, the centrifugal force of the earth, in its rotation, causes the water or the denser fluid to accumulate about the equator, and consequently this Petroleum or lighter fluid to separate from it and flow and accumulate about the north pole; that being light and oily it is highly susceptible of capillary attraction, that this sandstone strata crops out in the Acrtic Ocean, and absorbs this oil, inducing it by capillary attraction to flow in its cannel or strata, under this continent, in a southerly and south-westerly direction, that it crops out again in the Pacific Ocean, and there exudes and mingles with the waters of the Pacific, giving the ocean its mild and placid character, and forms the well known oleaginous food for whales, which is visible, and exists in the water of that ocean, and extends thousands of miles northward, and on which the whales live, and derive their oil, and called their feeding ground. In the Pacific Ocean it flows again northward, through Behring's Straits, by the same law which made it accumulate in the open Polar Sea, that is, being lighter than water, and not capable of uniting with it, the water, which is heaviest, will accumulate about the equator, while this oily lighter matter will flow to the north pole, and there form the open unfrozen sea. Thus it performs its great office in the laboratory of nature, flowing in a circle through this particular strata of sandstone, under this continent, from the Arctic to the Pacific Oceans, by capillary attraction and there plainly visible in the water in a coagulated form, as the food of whales, prepared in and by the very salt and dense water of that temperature, and flowing in the process of separation for thousands of miles northward, forming necessarily the open or unfrozen Polar Sea, and being the great basis of carbon or oil of the earth for the use of man.

Which of these theories is true, time and investigation alone will show. One or the other must be true.

No. 1 leaves everything unexplained.

No. 2 explains everything before unaccounted for, and establishes a grand united series of principles dependent on each other, in the wonderful economy of nature, in keeping with known laws and settled principles of matter. The supply is inexhaustible; it runs through Canada, and in a circuit to the Pacific, through New York, Pennsylvania, Ohio, West Virginia, Kentucky, crosses the Mississippi, and flows into the Pacific Ocean. That the heavy or lubricating oil is thrown nearer the surface of the earth by centrifugal force of the earth's rotation, and that it accounts, 1st, for the promotion of coal; 2d, salt water flowing with it goes to prove my theory; 3d, it accounts for the feeding matter of the whales in the Pacific, and their wonderful oleaginous nature; 4th, it accounts for the open Polar Sea; 5th, it accounts for its flow in sandstone formation; 6th, the aggregation of these facts establish the perfect conclusion at which I arrived. The subscriber could adduce other isolated facts in Europe which go to prove the soundness of the laws of matter adduced in this theory.

The following correspondence was published in the *American Exchange and Review* for December.

At Oil Creek I saw revived the old practice of using the divining rod. The operator holds in both hands the two prongs of a forked stick, with the single end in a vertical position,—on a line with his nose—and when he approaches an oil spot, the single end of the stick (so he says) turns forcibly over, and points to the earth. They are said to miss about as often as they hit. Salt water invariably accompanies the oil, and some predict the future productiveness of the well by the extent to which the first water is saturated with salt. All the wells pass through the same formations, both at Dunkard and Oil creek, alternate layers of sand-rock and shale, and when a basin has been reached, the tool falls. The wells are commonly 4½ inches in diameter, and bored to the depth of 500 to 630 feet. A tube is then put down the whole length of the well to within a few feet of the bottom, sometimes only 6 feet, into the third sand-rock, into which a pump is fixed, and the oil pumped into a tank. The salt water which accompanies the oil is drawn off by a cock near the bottom of the tank, and the oil by another about half way up. The oil is then sold at the well, and the owner ships it to its point of destination.

Borers say they are nearing the oil when the sand-rock appears spongy, and contains small pieces of shale.

Many refiners are moving their utensils to Oil City from other places, for convenience, and here I will suggest the propriety of erecting works for the manufacture of vitriol and caustic soda at Dunkard creek. Already parties are erecting salt works at Dunkard, and the cost of erecting a manufactory of vitriol and soda would be but slight in comparison with the advantages of having them on the spot.

In the process of making caustic soda, or soda ash, the vitriol is powdered in common salt, which converts it into a sulphate of soda; this is burned until its oxygen and a part of its sulpher are driven off, when it is called soda ash. It is more properly a sulphuret of sodium. It is caustic, and neutralizes acids. Its remaining sulphur is separated from it by boiling it with lime. Both vitriol and sulphur are necessary in the process of refining, and by having these materials at hand, a refined, merchantable article can be sent directly from the wells to market, and the trouble and expense of transhipment and re-packing saved.

BORING.—In boring, a chisel-shaped tool is used, about 3 feet long, made of iron, 2¼ inches in diameter, with the chisel-edge wider, and tipped with the hardest steel. This is attached to a rope, and raised and let fall, (continually during working hours); a man sits immediately over the well, who turns the ropes as the chisel falls, by which means the tool is turned round as it cuts, just as we see them drilling holes in stones in the streets for railroad purposes. This chiselling is continued until the required depth is attained. In boring through the rock, 3 feet per day is the average, but in the softer shales much greater progress is made.

The following are the alternations of the formations as they occurred in boring a well on the McClintock estate, to the depth of 1000 feet, by the Messrs. McKenney. It is worthy of note, that oil was not again met after passing the third sand-rock.

Soil	10 to 40	feet.
Slate Rock	200	feet.
White Sand stone	40	"
Soapy Slate	100	"
Sand-rock	25	"
Slate and Soapstone	100	"
Sand-rock	10	"
Slate	400	feet.

And then a fourth sand-rock was reached. It is probable that what was described to me as soap-stone slate was nothing but shale. This well was sunk on Oil creek, and the formations here, like those of Dunkard, are nothing but alternate layers of sand-stone and shale, (a mud rock).

The most prolific wells are those which derive their oil from the third sand-rock, or under it. The Messrs. McKenney have 11 wells on Oil Creek, and have much intelligence and practical experience.

The occurrence of pebbles in the third sand-rock is regarded by operators as a favorable symtom, and should oil be abundant in the first or second sand-rock, it is regarded as unfavorable. I have been told that the wells flow more copiously after a rise in the water courses. Operators tell me that boring at the foot of ravines has not proved more successful than in other localities. To give you some idea of the value of some of these wells, I may mention that one, the Hibberd well, sold for $115,000, while I was at Oil City, although yielding but 80 barrels per day; and I have been told that some of them are valued at $4,000,000. This Hibberd well was sold last year for $22,000.

Scarcely more than 1 in 10 of the wells in Oil creek flow, I am told, but it is the opinion of practical men that they can be revived. Some wells, which originally flowed 1,000 and 2,000 barrels per day, have dwindled down to 50 and 60. They all run down in the course of 2 or 3 years, but can be worked for a long time afterwards. The wells several miles above Oil City are said to be the most prolific, and much excitement was occasioned by the finding of one on Cherry run, a few miles obove Oil City recently, which yields it is said, 200 barrels per day. The extent of land bored over on Oil creek is nearly 18 miles, Among the flowing wells of Oil creek, several yield 1,000 to 1,200 barrels per day. As a general average, the flowing wells on Oil creek may be set down at 100 barrels per day.

An idea of the value of land on Oil creek may be gained from the fact that the McClintock farm, of 400 acres was sold for $4,000,000. These lands, except for their value as oil lands, would scarcely bring $100 per acre. One well, which flowed 3,000 barrels per day for one year, now flows but 40.

The average cost of sinking a well, and furnishing the necessary machinery, is about $6,500. Sinking the well cost about $4,000; necessary buildings and utensils, $1,000; portable engine, 1,500. The derrick covers an area of 14 feet, is about 40 feet high, and consists of 4 poles, fastened together, narrowing at the top to about 6 feet.

In flowing wells, nothing is needed except the tanks and rude buildings which cover them, but the number of flowers in comparison with pumpers is comparatively small.

Taking into consideration the abundance and cheapness of coal, the facility of transportation, and the great superiority of the oil, I regard the lands on the Monongahela and its tributaries, as by far a more desirable investment than those of the Alleghany and its tributaries.

There is what is called the Dunkard ripple, near the mouth of Dunkard creek, which extends a considerable way across the Monongahela, and might be of value in the erection of a dam, which would enable the operator to ship his oil East at a much less expense then can be done at Oil creek. Yours, truly,

INVESTIGATOR.

The *American Exchange and Review*, for December, has the following:

New companies come thick and fast, and though their number startles the cautious and timid, there appears to be room for all. A few weeks ago it seemed as if Philadelphia capital could scarcely take up the enterprises then pressing upon it, yet Philadelphia continues to lead in the manufacture of oil corporations, and stock buyers multiply. Among the fresh conceans, the creations of the last two months, are the best and the worst yet put upon the market.

MNING.

EROSION OF LEAD BY INSECTS.

The erosion of lead, and even of type metal, by certain species of insects, is not generally known, and may be extremely mischievous. Not long ago it attracted the attention of the French Academy of Seiences, and several communications upon it have been published in their proceedings, the *Comptes Rendus*. Of these the following *resume* may probably be acceptable to your readers.

In 1858 Marshal Vaillant exhibited to the Academy leaden bullets brought back from the Crimea in some of which the larvae of insects had excavated circular passages three or four millimetres in diameter, and in others superficial grooves. Inquiry was made through the Russian Ambassador, M. de Kisselef, whether similar erosion had been observed in Russia. M. V. de Motschulsky replied that nothing of the kind had been detected in the cartridges of the Russian army in the Crimea, and that the insect which had caused the injury appeared to be very rare in Russia, not having been discovered by Russian entomologists in the Crimea. It is stated to be very common in England, Sweden, and Germany, and to occur in the Jura in France. It attacks silver firs and pines.

The insect which damaged the French cartridges was imported from France in the wood of the cases in which they were packed. All the excavated passages were originally circular in section, and those that were simicircular in section, that is, superficially grooved, were only segments of which the other half was in the contiguous surface of other bullets or of the wood forming the sides of the cases. The passages were always open at both ends. Excavation was effected by the mandibles of the insect, the apparatus consisting of a saw toothed and cut like a file. The insects do not eat the lead, but simply bore it out; and it was observed that their remains after metamorphosis had been carried downwards by the particles of the metal, reduced to powders, and dispersed on the outside through the cracks in the bottom of the packing-case. The perfect insects did not attack the lead, but died in the passages, even immediately after their complete metamorphosis, as very often occurs with insects in general.

In 1833 Audouin exhibited to the Entomological Society of Paris sheet lead from the roof of a building deeply grooved by insects. In 1844 Desmarest mentioned erosions and perforations of sheet lead by a species of Bostriche (*B Capucina*), and illustrated the fact by cartridges from the arsenal at Turin. Mr. Westwood, the well-known British entomologist, has recorded observations by himself on the perforation of lead by insects. M. Couteille, curator of the Museum of Natural History at Grenoble, sent to the French Academy of Sciences, from the collection under his charge, specimens of cartridges gnawed by insects, which were found *in situ*, and the following report upon the subject was made by Marshal Vaillant, de Quatrefages, and Milne Edwards:—The insect was *Sirex gigas*, a large hymenopterous species which, in the larva state, lives in the interior of old trees or pieces of wood, and which, after the completion of its metamorphosis, quits its retreat for the purpose of reproduction. As previously stated, it cuts its way by its mandibles, gnawing the woody substance or other hard bodies which it meets with in its course. Analogous perforations are made by the mandibles of the *Callidium sanguineum*. The reporters add:

"If it is probable that it is always with their mandibles that coleopterous as well as hymenopterous insects thus attack lead or other hard bodies, it is not well established that it is always the desire of liberty which prompts them so to act. Indeed, in some cases, coleopterous insects have been seen to gnaw the exterior of similar bodies.

Reference was made to a paper by Antonio Berti on the perforation of leaden pipes by an insect named *Apate humeralis*,

Scheurer-Kestner, in 1861, communicated to the French Academy a notice of the erosion by an insect of the sheet lead of a new sulphuric acid chamber. The creature was caught in the act of escaping through the lead, having been imprisoned between it and a wooden support.

Perhaps the most interesting and important case of insect erosion is that of stereotype metal, which was communicated in 1843 by M. du Boys to the Agricultural Society of Limoges. Specimens riddled with holes were shown in illustration. It would be desirable to ascertain whether similar mischief has been observed in this country.

From what has now been advanced, it is evident that in these days of rifle matches the depredations of the sirax might occasion serious annoyance. Even the superficial grooving of a bullet on one side might cause the defeat of the best marksman in the world. It was hoped that our mortal remains when enclosed in a leaden coffin would at least be protected from the access of air and of living creatures from without; but we now learn how illusive is that hope in the presence even of such a contemptible insect as a sirex.—*London Practical Mechanic's Journal.*

HEALTH OF MINERS.

The question which first claims attention is the health of miners. It may be affirmed as a general proposition, that the health of the copper, tin, and lead miners, as a class, is greatly inferior to that of laborers engaged in agricultural and other open air employments, an assertion which is corroborated by the periodical returns of deaths made to the Registrar-General. At a comparatively early age the miners almost invariably exhibit in their features and persons the unmistakable signs of debilitated constitutions. Their faces are sallow, they have an anxious expression of countenance, and their bodies are thin. At the border of middle age, or soon after, their health begins to fail, the maturity and confirmed strength of that time of life seems to be denied to them, they rapidly acquire the feebleness of declining years, and become unfit for laborious work at the time when their experience and skill would otherwise have made them valuable workmen. It is a common remark in Cornwall, that "a person of 50 is old for a miner." The first symptoms of failing health among the miners are weakness in the limbs in climbing the ladders and beating the borer, shortness of breathing, giddiness, and pains in the head; their appetite fails, they are unable to take or digest an adequate amount of food, and often suffer from sickness and vomiting. These symptoms are followed by harassing cough, much expectoration, sometimes of mucus, occasionally of blood, tightness of the chest, and failure of general strength. These affections precede total disability to work, followed by premature death. The delicate condition of the miners is the more striking when contrasted with the appearance of vigorous health generally presented by the women and children in the same districts, thus showing that the causes which operate injuriously upon the health of the miners are such as do not affect their wives and families. It is much to be regretted that the medical gentlemen connected with the mines have not turned their attention to a special investigation of the causes and nature of the "miners' disease," by examining the localities and the air in which the men work, and by endeavoring to get an insight into the disease by post-mortem examination. It is alleged that the prejudices of the surviving relatives of deceased miners against such examinations are too strong to be overcome; but there is ground for believing that these are not in all cases insurmountable. From want of sufficient investigation, hasty, and in many instances erroneous, returns of the cause of death have been made in the district registrars. From the disease peculiar to miners being commonly registered as consumption, it has been by many supposed to be identical with phthisis, or tubercular pulmonary consumption; but is proved by the evidence of the medical witnesses that though some miners, and especially those whose families are predisposed to the affection, do die of consumption, by far the largest amount of mortality is due to other forms of lung disease of a bronchitic or asthmatic char-

acter. The commissioners have anxiously endeavored, by obtaining all the information in their power, to discover the true cause of the maladies which cut off a very large portion of the mining population so long before the expiration of the period usually allotted to human existence.

By the request of the chairman, Dr. Peacock and Mr. Bankart visited the mining districts of Cornwall and Devon, and their reports are given in an appendix. Dr. Peacock examined 83 miners who were laboring under different forms of disease, and above 500 who were still at work; and Mr. Bankart has reported on 150 ailing or disabled miners These gentlemen agree in representing the sanitary condition of the mining population as very defective, expressing the opinion that the men are worn out by their labor at a much earlier period than is usual with persons who follow occupations equally laborious in the open air. The cases of disease which they met with were chiefly asthmatic affections resulting from bronchitis, pneumonia, and disease of the heart, and more rarely from tubercular consumption. They also state that rheumatic disorders and various dyspeptic symptoms are of common concurrence among the miners. They ascribe the unhealthy condition of the mines to various causes, among which they refer to the early age at which he miners commence working underground, to the severity of the labor which they undergo, especially in deep mines, where ladders are the only means of access, to working in a heated atmosphere or in places which are draughty or wet from defective drainage, but more particularly in the impurity of the air which the men have to breathe when underground. They also state that exposure to cold and damp at the surface or in the shafts and other parts of the mines is the most frequent exciting cause of disease among the miners, operating with peculiar severity upon men in a state of perspiration, or exhausted from having worked in close places, or ascended ladders from great depths, and especially upon those already enfeebled in health and strength. The early period of life at which the miners begin to work underground very materially conduced to their premature decay. Dr. Peacock shows in his report that of the men whom he examined 39 per cent. went to work when 10 to 13 years of age, and 48 per cent. before the age of 14. He remarks that "experience shows that when persons in early life are exposed to injurious influences they suffer them more severely, and earlier fall under their influence, than if they had attained a more advanced age and greater constitutional vigor."

VITAL STATISTICS.

From the evidence given before the commissioners by Dr. Farr, F.R.S., Chief of the Statistical Department of the General Register Office, and from a return prepared for them by the Registrar-General, and printed in the appendix, they are enabled to show the rates of mortality prevailing among the miners of Cornwall at different periods of life, as compared with those prevailing among the non-mining population of the same districts, both for the five years 1849-'53 inclusive, and also for the more recent triennial period 186 -'62 inclusive. The districts selected for the purposes of this comparison were those of Liskeard, St Austell, Truro, Helston, Redruth, and Penzance. The death rates were computed from the aggregate numbers of males and of deaths of males of the two classes respectively in the whole six districts taken together. The subjoined table shows the rates of mortality from all causes during the earlier period, 1849-'53, among the two sections of the population, for the several successive decennial periods of life, from the age of 15 up to that of 75 years:

Age.	Metal miners, pr. 1000 pr. an.	Males, exclusive of miners, ditto.
Between 15 and 25 years	8·90	7·12
" 25 and 35 "	8.96	8·74
" 35 and 45 "	14·30	9·99
" 45 and 55 "	33·51	14·76
" 55 and 65 "	63·17	24·12
" 65 and 75 "	111·23	58.61

From the figures in the above table, it appears that the rates of mortality among the miners are not materially different from those prevailing among the non-mining males of the same districts, until after the age of 35 years, from which period there is a large and progressive excess of mortality among the mining section of the male population. If we assume the rate of mortality among the non-mining males at each decennial period of life to be represented by 100, then that among the miners would be represented by 125 between the ages of 15 and 25 years, by 101 between 25 and 35, by 143 between 35 and 45, by 227 between 45 and 55, by 263 between 55 and 65, and by 189 between 65 and 75 years. That the large and progressive excess of mortality among the miners between the ages of 35 and 65 years must be due to unwholesome conditions incident to their occupation, may be inferred from the fact that it does not commence until these have had full time to operate. The somewhat higher rate of mortality among miners between the ages of 15 and 25 years probably arises from the circumstance that many of the boys are put to work in the mines at too early an age. That the excessive mortality among the miners in Cornwall is not caused by the mere working underground in dark galleries, a necessary condition of the miner's occupation, and must, therefore, be mainly due to other causes, is clearly proved by some statistics relative to the coal miners of Durham and Northumberland, also given in evidence by Dr. Farr. The annexed table shows the rates of mortality among the coal miners of Durham and Northumberland during the years 1849 '53 inclusive, for each decennial period of life from the age of 15 up to that of 75 years, compared with the rates among the Cornish miners already quoted—per 1000 per annum, as before:

Age.	Cornish metal miners.	Northern coal miners.
Between 15 and 25 years	8·90	8·50
" 25 and 35 "	8·96	8·49
" 35 and 45 "	14·30	10·13
" 45 and 55 "	33·51	16·81
" 55 and 65 "	63·17	24·43
" 65 and 75 "	111·23	65·16

Assuming as with regard to the previous table the rate of mortality among the coal miners at each period of life to be represented by 100, then that among the Cornish miners would be represented by 105 between the ages of 15 and 25 years, by 106 between 25 and 35, by 141, between 35 and 45, by 199 between 45 and 55, by 258 between 55 and 65, and by 171 between 65 and 75 years. The rate of mortality among the Cornish miners from the age of 35 years upwards are thus shown to have been almost as much in excess of the rates which prevail among the coal miners in the selected districts of Durham and Northumberland as they were above the rates prevailing among the non-mining male population of Cornwall. The evidence regarding the more recent period, 1860-'62, shows that the great excess of mortality among the Cornish miners still continues, although the proportions are slightly different. The subjoined table shows the rates of mortality among the two sections of the male population respectively, from all causes during the three years 1860-'62, for the same periods of life as the former table:

Age.	Metal miners.	Males, exclusive of miners.
Between 15 and 25 years	9·44	7·50
" 25 and 35 "	9 57	8·32
" 35 and 45 "	15·12	10·08
" 45 and 55 "	29·74	12·50
" 55 and 65 "	63·21	19·96
" 65 and 75 "	110·51	53·31

Again, assuming the mortality at each period of life among the non-mining males to be represented by 100, then the rate among the miners would be represented by 126 between the ages of 15 and 25, by 115 between 25 and 35, by 150 between 35 and 45, by 238 between 45 and 55, by 317 between 55 and 65, and by 207 between 65 and 75 years. From Dr. Farr's evidence, supplemented by the Registrar-General's return, it further appears that the excessive rates of mortality among the Cornish miners is mainly caused by the large number of deaths from pulmonary consumption and other diseases of the lungs. As, however, deaths which are registered in some districts as arising from consumption are registered in other districts under different names, such as asthma and bronchitis, it is best for statistical purposes to throw all the diseases of the lungs into one class, under the general name of pulmonary diseases; an arrangement which enables the rates of mortality from diseases of the lungs in different districts to be more accurately compared with each other than if the several diseases of these organs were nominally kept separate. The class of pulmonary diseases thus formed, comprises phthisis, laryngitis, bronchitis, pleurisy, pneumonia, asthma, and all cases returned as "diseases of the lungs." The annexed table shows the average annual rate of mortality per 1000 persons from pulmonary diseases among miners, and also among males exclusive of miners, during the three years 1860-'62 inclusive, for each decennial period of life between the ages of 15 and 75 years:

Age.	Metal miners.	Males, exclusive of miners.
Between 15 and 25 years	3·77	3·30
" 25 and 35 "	4·15	3·33
" 35 and 45 "	7·89	4·24
" 45 and 55 "	19·75	4·34
" 55 and 65 "	43·29	5·19
" 65 and 75 "	45·04	10·48

Assuming, as before, that the rate of mortality among males exclusive of miners is represented at each period of life by 100, then that among the miners would be represented by 114 between the ages of 15 and 25 years, by 108 between 25 and 35, by 186 between 35 and 45; by 455 between 45 and 55, by 834 between 55 and 65, and by 430 between 65 and 75 years. It is, therefore, evident that the pulmonary diseases are the chief cause of the excess of mortality among the Cornish miners; and that these diseases are due to the conditions incident to the miner's labor may also be confidently inferred, as in the case of the death-rates from all causes, from the fact that the excess of mortality arising from them does not reach its acme until after the middle of life, when these conditions have had full time to produce their effect on the health of the miners. A much greater discrepancy will be observed between the rates of mortality from pulmonary disease among the miners and non-miners than has been shown to exist between the rates of mortality from all causes among the two sections of the population respecfively. This is undoubtedly due to the fact that exposure to the peculiar evils incident to their occupation causes many miners to die of pulmonary diseases, who in different circumstances would have died of other complaints. The subjoined table contrasts the rates of mortality among miners at the two periods 1849-53 and 1860-'62, both from all causes and pulmonary diseases:

	All causes.		Pulmonary diseases	
	1849-53.	1860-62.	1849-53·	1860-62
Between 15 and 25 years	8·90	9·44	3·05	3·77
" 25 and 35 "	8·96	9·57	4·42	4·15
" 35 and 45 "	14·30	15.12	8·47	7·89
" 45 and 55 "	33 51	29 74	24 81	19·75
" 55 and 65 "	63 17	63 21	44·46	43 29
" 65 and 75 "	111·22	110·51	55·87	45·04

It will be seen in the above table that the only material difference in favor of the more recent period is that existing between the ages of 45 and 55 years. A comparison of mortality from all causes among the non-mining section of the male population also shows a similar improvement in favor of the more recent period.

ON THE MECHANICAL DRESSING OF ORES.

Having already considered some of the forms of machine for comminuting ores, we have still another class of machine for the same purpose, the object of which is to comminute the ore to a state of fine division without pulverising it to powder. The machines to which we refer are called stamps, and have been employed by miners for years, and even centuries, and have been universally found satisfactory, for two reasons; firstly, because they get through a greater amount of work in proportion to the power employed than any other machines; and, secondly, because they comminute the ore without reducing it too fine. In considering these machines from a general point of view, we may say the

stamps are made of a heavy mass of cast-iron; placed at the base of a lifter of wood or wrought iron; and three or four of these being placed together in one case form a battery or set; and, when few in number, may be worked by water power, and when multiplied are usually worked by powerful engines. In olden times, stamping machines were made very coarsely, and there were usually three heads in one box; but the heads were irregular in form, and, consequently, the stuff was most unevenly broken up. In treating of stamping machines, we will consider them under the following divisions:

1. The form of the stamp-head. 2. The lifter. 3. The means of raising the lifter. 4. Kofer. 5. The frame in which the stamps are fixed. 6. The mode of outlet for the stamped material. 7. The barrel by which the stamp heads are raised.

First, then, of the stamp-head. These should generally weigh from one and a half ton for ordinary stuff, although where the rock is very hard the weight must be increased to five and even six cwts. In most cases the stamp-heads are of cast-iron, and eighteen to twenty inches in length. The heads, as commonly made in the foundry of the present day, are cast with a shank, by which the lifter may be very readily attracted to the head.

Secondly, of the lifter, which was made invariably in olden times of wood, deal, pinewood, or ash being generally preferred. This sort of lifter is, however, now-a days invariably made of iron. The weight of the lifter is a matter for consideration; an extra weight in the lifter certainly tends to give a more uniform blow, and for this reason iron lifters would seem to be preferable. We must, however, allow that iron lifters are liable to get thrown out of shape after some use. Wooden lifters are generally considered preferable to iron ones, since they work more evenly, and produce less friction. Some excellent examples of wooden lifters may be seen at the Charleston United Mines.

Thirdly, as to raising the lifter, we find the head most effectally performs its functions when raised from ten to twelve inches. The lifting is effected by means of what is called a tongue, of which the best are made of iron. One end of the tongue passes through a slot in the side of the lifter, and is there fixed with wooden wedges, and the whole kept tight by a wedge, binding the end of the tongue which has passed through the lifter. The lifter must be retained in its position on either side by braces. Now, on raising the lifter, a rotary motion is necessarily given to it, which causes a great amount of friction, and to avoid this, numberless devices have been proposed; one was to make a hole in the lifter, into which the cam raising it should fit; such an idea, however, cannot be entertained, as the arrangement must so materially weaken the litter. Another proposal has been to raise the lifter by a double cam, one arm passing on each side of the lifter. We cannot see, however, that such a device can at all diminish the friction. The question then arises, what are the best means of avoiding friction? We think, by adopting the following simple means, common on the Continent, and sometimes seen in England, a great deal may be prevented. The plan is to place between the bearing parts of the frame and the lifter, long, thin, slips of wood, which, if kept well greased, will act as slides. In the tin districts it is more usual to supply a guide made of a triangular piece of iron fixed by screw bolts into the pieces at the back of the brace up which the lifter slides. An Australasian form of stamps has lately been brought out as a great improvement. Its peculiarities are, that both the lifter and head are of circular form, and its so-called advantages that a rotary action is given to the head as the cam lifts it. For many reasons, and some of which we have enumerated above, this motion is peculiarly objectionable, and we may consign this machine, without hesitation, to the limbo of obscurity.

We now come to the kofer and frame, which we may truly say constitute the most important parts of the stamps. The whole frame is universally based on some good concrete, and is divided into partitions by uprights. The kofer may be looked on as a box of wood of any convenient form, the most important part of which is the arrangement for allowing the escape of the ore directly it is reduced to the proper state of fineness, since, if kept in the kofer beyond that time, there must of necessity be a loss in the finer particles of the ore. Now, the escape of the ore is usually effected through a grating, of which there is one in front of the kofer and one at each end. As the stamp head, after being lifted, descends, a wave will be produced in the contents of the kofer, which, in its passage, will carry through the grating the comminuted particles. There are other forms of kofer where the ore escapes over the top of the box, but this form is used only when it is required to stamp very fine. Sometimes the ore escapes through a slit in the upper part of the kofer, which is termed "stamping in the flash." In Hungary they have a very nice way of regulating these flash stamps, by placing a little slip door between the slit and the stamp-head. There is no part, be it remembered, of the stamping process which requires so great care, on the part of the agent, as the size of grating through which he shall pass the stamp stuff. A great deal depends on it, and experiments should be continually made to arrive at the proper degree of fineness to which it is desirable to reduce any particular kind of ore.

We must now say a few words on the last division of our subject, "The Barrel." It consists of a barrel of cast-iron with holes in it for the cams, and is cast with proper bearings to fit on plumber blocks. It may be worked by water-power or steam. A stamp, to be working at the greatest speed for perfect efficiency, should lift each head to make from fifty to sixty blows per minute. The quantity of stuff stamped must depend on its hardness, as also on the proportion of water admitted. The number of laborers required to keep stamps in work should be four men to every thirty-two heads. In some Cornish mines there are from 30,000 to 36,000 tons of tinstuff stamped per twelve months.—*Prof. W. W. Smyth, Royal School of Mines, London.*

ON A METHOD OF EXTRACTING GOLD FROM AURIFEROUS OPES.

BY DR. GRACE CALVERT, F.R.S.

(*Read before the British Association, Bath, England.*)

At the present time, when the auriferous ores of Great Britain are attracting public attention, it may be advantageons to persons interested in gold mining to be made acquainted with a new and simple method of extracting gold from such ores, which presents the advantages of not only dispensing with the costly use of mercury, but of also extracting the silver and copper as well as the gold which the ore may contain. Further, it may be stated that the process can be profitably adopted in cases where the amount of gold is small, and the expense of the mercury consequently too great. Without entering here into all the details of the numerous (about one hundred) experiments which I made some years since, before I finally arrived at the new method of extracting gold, which I have now the honor of communicating to the meeting, allow me to state a few facts which are necessary to give a general view of the subject. If 2·2 parts of pure and finely divided gold, obtained by the reduction of a salt of that metal, be added to 100 parts of pure sand, and placed in a bottle with a saturated solution of chlorine gas for twenty-four hours, only 0·5 of gold is dissolved. If the same experiment be repeated, but, instead of chlorine water, a mixtare of chlorine water and hydrochloric acid be used, 0·6 of gold is dissolved. If, instead of employing hydrochloric acid and chlorine gas, a mixture of sand, reduced gold, and proxide of manganese, with hydrochloric acid, are placed in a bottle, 1·4 of gold is dissolved; so that it would appear that under the influence of nascent chlorine, the gold is more readily dissolved than when the same gas is mixed in solution with hydrochloric acid previously to being placed in contact with the auriferous sand. Still these processes have a great deal to be desired in a commercial point of view, as more than a third of the gold remains undissolved; and the same results are obtained if the chlorine gas be generated by another method, viz., by adding to the auriferous sand a mixture of chloride of sodium sulphuric acid, and peroxide of manganese. Being convinced, therefore, that nascent chlorine gas was a fit and proper agent for cheaply extracting gold from ores, and that it was only necessary to modify the method of operating, I allowed the mixture of hydrochloric acid and peroxide of manganese, or of sulphuric acid, peroxide of manganese and chloride of sodium, to remain for twelve hours in contact with the auriferous sand; and then, instead of washing out the solution of gold, I added a small quantity of water, which removed a part of the acting agent, and this was made to percolate several times through the sand; by which method I succeeded in extracting from the sand, within a fraction, the whole of the gold. I then repeated the first experiments with natural auriferous quartz, and easily extracted the two ounces of gold per ton which it contained. I, therefore, propose the following plan for extracting the gold on a commercial scale:

The finely-reduced auriferous quartz should be intimately mixed with about 1 per cent. of peroxide of manganese; and if common salt be used, this material should be added at the same time as the manganese, in the proportion of three parts of salt to two of manganese. The whole should be then introduced into closed vats, having false bottoms, upon which is laid a quantity of small branches covered with straw, so as to prevent the reduced quartz from filling the holes in the false bottom. Muriatic acid should then be added if manganese alone is used, and diluted sulphuric acid if manganese and salt have been employed, and after having left the whole in contact for twelve hours, water should be added so as to fill up the whole space between the false and true bottoms with fluid. This fluid should then be pumped up and allowed to percolate through the mass, and after this has been done several times the fluid should be run off into separate vats for extracting the gold and copper that may contain. To effect this, old iron is placed in it to precipitate the copper; and after this has been removed, the liquor is heated to drive away the excess of free chlorine, and a concentrated solution of sulphate of protoxide of iron, or green copperas, is added, which acting on the gold solution, precipitates the gold in a metallic form. By this method both gold and copper are obtained in a marketable condition. If silver is present in the ore, a slight modification in the process will enable the operator to obtain this metal also. It is simply necessary to generate the chlorine of the vitriol, manganese, and chloride of sodium process, taking care to use an excess of salt, that is, six parts instead of three, as above directed. The purpose of this chloride of sodium being to hold in solution any chloride of silver that may have been formed by the action of chloride on the silver ore, and to extract the metal, the following alteration in the mode of precipitation is necessary. Blades of copper must be placed in the saline solutions, to throw down the silver in a metallic form, then blades of iron to throw down the copper, the gold being then extracted as previously directed. I think the advantages of this process are, 1st, cheapness; and, absence of injury to the health of the persons employed; that not only is the metallic gold in the ore extracted (as is done by mercury), but it attacks and dissolves all gold which may be present in a combined state, besides enabling the miner also to extract what silver and ore may contain. I cannot, however, conclude without reminding you of what is generally underrated—that is, the heavy expenses which attend the bringing of the ore to the surface, its crushing and preparation to render it in a proper state for being acted upon either by mercury or by any other agents.

VALUABLE MINERALS IN CALIFORNIA.

We often hear outside of California of the high value and extended use of metals and minerals which abound in immense deposits in the Pacific domain. Bismuth, which is extensively used in type making and the mechanical arts, and is now very high and scarce,

is said to be found plentifully in some of our mineral formations. Antimony exists in immense masses, and of very rich quality, near the Tejon, and can be carted away from the top of the ground; it is said to contain a handsome ley of silver. Zinc and tin, which are now very expensive metals, are met with in valuable lodes in the counties of Mono and Los Angelos. Chromic iron is found in immense abundance in Monterey and other Southern districts. Iridium, osmium and platinum are not scarce in the gold washings of Klamath and Del Norte counties, and discoveries of these have also lately been made in Idaho. The sulphur deposits of Clear Lake and those of Nevada Territory are on a magnificent scale and of the purest quality. Borax, nearly free from extraneous matter, can be gathered by bushels, and there is no end of it, seemingly, in all the mountains of Lake county, where obsidian or volcanic glass, ready to make wine bottles at a blow, is as plentiful as the world wants—a true mine of glass. Of porcelain clay of the finest quality there is a like quantity; and of umber, terra sienna, paint ochres of different colors, manganese and magnesian earths there is great plenty. As California has some of the purest aluminous clays in abundance, the new metal aluminum could likely be profitably made. As to copperas, soda, alum, jasper, agate, chalcedony, hematite and such substances, there is no end of them. It would be interesting and important to the owners of lands in which the various materials above mentioned exist, to learn the markets and places of demand for them in Europe and the Alantic States, and the prices which they ordinarily command there. Perhaps some correspondent who is familiar with the subject may have a few words to say about it.—*San Francisco Bulletin.*

GAS.

IMPURITIES IN GAS.

At a certain stage of its manufacture—that is when the gas leaves the retorts, and before it has been subjected to the purifying process—gas contains certain constituents which render it quite unfit for use. These noxious constituents are of two classes—one can be entirely removed by the ordinary purifying means, and this is professedly done with all the gas supplied to the public; the second, which consists of certain compounds of sulphur, cannot be removed by any practical means at present known; therefore, whatever amount of this second class of impurity is produced in the gas at the time of its generation in the retort, remains in it when it is delivered to the public: and it is respecting this that so much is heard in relation to the quality of the gas supplied at the present moment in London. "Full of sulphur" is the cry, and a very irrational cry it is, so far as the public judgment is concerned. In times past, the gas supplied to the consumer was "full of sulphur" in a very different sense; then the so-called "purification" was incomplete indeed; and much of the sulphur, which existed in the form of sulphuretted hydrogen, both free, and combined with ammonia, passed out of the works with the gas, and was a source of annoyance and damage to the consumer. But it is well the public should comprehend that the strongest distinction must be drawn between impurity such as this, and the impurity of the gas now sold. The sulphuretted hydrogen and the ammonia are entirely removed from such gas, and the sulphur which remains is in a form which enables it to escape the purifying operations of the gas manufacturer, and which deprives it *per se* of the noxious qualities of sulphuretted hydrogen. The effect of a strong manifestation of public feeling upon this point sometime since, was to force the legislature, for the protection of the consumers, to pass an act dealing with the question, and from the evidence given before the committee at the time, it was so distinctly shown that gas could not be supplied free from this residual sulphur, that the law, as it now stands, permits the sale of gas containing, at the maximum, 20 grains of sulphur per 100 cubic feet of gas. Passing a law to compel the gas companies to distribute gas absolutely free from sulphur would have been simply a prohibition to gas making, and a retrocession to the days of the filthy and ineffective oil lamps. It being, then, at least at present, a question of gas with 20 grains of sulphur in the 100 cubic feet, or no gas at all, it is very desirable that the public should know something of the effect of this sulphur upon health, or otherwise. Passing by the sensation statements as to alarming quantities of oil of vitriol produced during the burning of such gas, we will endeavor to give a short, common sense account of the matter.

Sulphur burned in the air is converted into the gas called sulphurous acid. This is the suffocating gas which is produced when a sulphur match is lighted; and the sulphur contained in the gas is converted into it during the burning of the gas, and it passes into the atmosphere with the other products of combustion.—20 grains of sulphur produce, when burned, 40 grains of sulphurous acid, which in bulk equal rather more than 58 cubic inches. So that 100 cubic feet of gas, containing 20 grains of sulphur, produce, in burning, 58 cubic inches of sulphurous acid gas. An ordinary fish-tail gas burner consumes 4 cubic feet of gas per hour; consequently, in a long evening, say from 6 till 12, it would consume 24 feet of gas. Two such burners afford light sufficient for a good sized room, and would consume 48 cubic feet of gas in six hours, producing in the atmosphere of such a room nearly 28 cubic inches of sulphurous acid gas. Supposing the room to be only 12 feet square, and 10 feet in height, its contents would be 1440 cubic feet of air: the 28 cubic inches of sulphurous acid gas are less than 1-60th of a cubic foot, or 1-8600th of the cubical contents of the room. Moreover, it must be remembered that this quantity is only thrown into the atmosphere *gradatim* during six hours, and that during that time some change in the air of the room must be taking place. It will, then, be seen, that the talk which is made about the "sulphur in gas" is, after all, raised upon what is practically a thing of very little, if any, importance, from a sanitary or economical point of view. It will be further seen how utterly trifling this is when it is considered that common house coal contains from 2 to 3 per cent. of sulphur, which is converted into sulphurous acid during its combustion. Every 100 lbs. of such coal yields, consequently, say 2·5 lbs. of sulphur, which produces, in burning, 5 lbs of sulphurous acid, which is equal to no less than 50,940 cubic inches of this gas. It is a moot question whether small quantities of sulphurous acid may not be wholesome rather than the reverse in an atmosphere charged, as that of the metropolis must always be, with organic exhalations; but, however that may be, the quantity produced in the combustion of common gas is far too small to permit of its producing any sanitary effect, noxious or otherwise.

There is a question of great, nay, of the greatest, importance to gas consumers, but it is one which relates to themselves, and not to the gas manufacturers,—that is, the proper ventilation of the rooms in which the gas is burned. One of the vices of gas consumption is the employment of an unreasonable amount of light. In a sitting-room, for example, which was formerly thought to be well enough lighted by a pair of wax or composite candles, two gas burners are commonly employed. Two fish-tail burners give light equal to that from 18 to 20 wax candles. How can we be surprised, then, at hearing the common complaint that "gas heats the room too much?" In a broad sense, the amount of heat produced by burning ordinary gas is proportionate to the amount of light, and the vitiation of the atmosphere is similarly proportionate to both, and it is in relation to this evil—one in nowise related to the gas manufacturer, nor really to the character of the gas itself—that some alteration is required: the more complete ventilation of our rooms and warehouses is the solution of the problem.—*Newton's London Journal of Arts.*

We find that in the month of December, 100 new organizations of Petroleum Companies, viz.: New York 29, Philadelphia 56, Pittsburg 9, Boston 3, Baltimore 2, Cleveland 1.

WATER.

SUPPLY OF WATER TO CITIES.

M. Grimand de Caux, the French hydraulic engineer, has just read (8th Aug, 1864), a very interesting notice to the Academy of Sciences at Paris, entitled—"Theoretic and Practical indications relative to the employment of the Canal of Marseilles, of the waters of the Durance, for domestic use or for other manufactures."

It is well known that Marseilles is supplied with water by the river Durance, which, conducted in artificial channels over limestone mountains and across several valleys—one passed by the celebrated Roque-Faveur aqueduct—for a total distance of 40 miles, is at last delivered into the numerous fountains of the city; sweeps past every curb-stone in its streets, flushes out its sewers, and at last delivers a copious volume into the old *Toilette* or inner harbor, and sweeps out to sea the formerly festering mass of putrescent matter that had collected and silted up much of its depth, and often in past times spread pestilence within the city, to which its waters brought trade and wealth. In this latter respect the supply from the Durance has been a matter of unmixed good to Marseilles. The quality of the water, however, the quantity of which is so abundant, appears to be by no means so satisfactory; in fact, it appears to be almost unwholesome, and in a very peculiar way unsuited both for manufacturing and for horticultural or agricultural purposes.

The water of the Durance, collected over a vast surface of sub alpine limestones, is at all times surcharged with an argillaceous mud of excessive fineness. This mud, after its deposit, has been analysed by M. Pisani. It consists, in 100 parts, of—

Aluminous clay	56·0
Carbonate of lime	39·6
Water not expelled at atmospheric temperature	4·4
	100

After the most prolonged repose, the whole of this sediment is not deposited, and the water still remains permanently opalescent. Mud deposits sensibly for five days of perfect repose, and after that the opalescence remains unchanged for lengthened periods, if not permanently.

When this water, as delivered by the aqueducts, is employed for watering crops, it has been proved to become a gradual but complete destroyer of fertility. The plants are, in fact, stifled; the stomata of their root-fibres become plugged up with this impalpable sediment, drawn in along with the water from the soil.

The Durance, in its own natural channel, after it has run as far as Avignon, Orgon, Pertuis, and other towns upon the lower river, is probably not in this state. In virtue of that wonderful power of separation that mere surface contact possesses, the water, while the river is in regimen, is cleared by passing for many miles over its gravelly bed.

But amongst the hills, in the neighborhood of St. Paul, where the water has been diverted into order to preserve the necessary head, the slightest rains produce muddiness, and the Marseilles Canal receives the water at once in this state.

When this canal was first projected, there would be in the suburbs of Marseilles about 6,000 hectares of land to water. As, according to M. Boussingault, each square metre of land requires in summer (in that locality) from 3 to 4 litres of water per day, there is required for that purpose alone, for the 6,000 hectares, or 60,000,000 of square metres, a minimum of 180,000 cubic metres of water. By the aid of settling basins, it is possible to avoid, in part at least, the evil effects of all this mud or vegetation. The upper portion only of the whole depth of water might be drawn off for delivery on the land.

Such a process is applicable to moderate surfaces of cultivated land at least, as, for example, of the gardens around Marseilles, for which, without extravagant cost,

settling basins might be provided; but can it be extended to clarify 900,000 cubic metres.

In fact, the municipality of Marseilles has already constructed four great settling basins on the line of the canal; but notwithstanding the repose of the waters in these basins, it enters the pipes of Marseilles still loaded with as much as 33 grammes (or nearly 2,000 grains) of mud in the cubic metre. At the present moment (with praiseworthy energy) the city is constructing a fifth settling basin at Realtort, to contain 3,750,000 cubic metres, and with a water surface of 75 hectares. It is obvious that while basins of this magnitude are exposed to the wind, that sufficient agitation will be propagated from the surface, almost at all times, to prevent a complete deposit of sediment so excessively communicated as this mud of the Durance. In the end, should pellucid water not be thus procured, resort must be had to filtration through sand beds, like those of the double filtering basins at Chelsea. Such filtering beds, which would have to be constructed on the banks of the river, at the point of diversion of the canal, must be on a great scale, be divided into several separate areas for clearing out, &c., and provide for the deposit of about 4 kilogrammes of mud for each cubic metre of content.

However, M. Grimand de Caux continues, the fertilization of the soil is in this case a secondary object. The primary one is to fully and properly supply the city, so that all, rich and poor, shall be provided with good drinking water; until that is accomplished, he rightly says, that in sight of the vast work it has constructed, Marseilles is not supplied.

The civic needs are two-fold—water for domestic use, and water for manufacturing purposes. M. de Caux calculates that the actual want of Marseilles is, on the whole, 500 cubic metres for 250,000 inhabitants per diem.

Occasional or unusual domestic demands, he thinks, may merge into those for manufacturing uses, and that both may be amply met by a supply of 25,000 cubic metres per diem.

The water capable of being brought in by the aqueduct is greatly beyond these demands. 25,000 cubic metres of the whole should then be deprived of its suspended matter, and the residue of the total delivery, after having, at the public fountains, spouted and been divided into liquid powder in the air, for the purpose of refreshing it, and promoting the health of the inhabitants, and then circulating past the water kennels, to sweep away their putridity, is to be delivered into the harbor.

With the head or pressure at command in the pipes of distribution the problem of filtration for domestic use appears to M. de Caux to be readily solved. The water will rise far above the top stories of any of the buildings.

He proposes to effect the filtration at the level of the street *in transitu* from the mains to the service pipes.

He fixes the following as primary conditions of filtration;

The filtering material should be neutral, inert, and incapable of acting injuriously on the water, and acting mechanically only in the removal of the suspended matter. Such are the siliceous gravels and sands of various fineness as set forth by Arago in his report (on Filtration of Paris Water) of 1837. Any substance of organic origin, vegetable or animal, such as sponge, wool, &c., &c., should be excluded as liable to be destroyed by maceration, getting decomposed, and fouling the water passing through them, by microscopic particles of their detritus, or charging it with gases developed in putrefaction.

It is not sufficient for drinking water that it shall have ceased to deposit any sediment, it should be as transparent as crystal, and more especially for the use of a climate such as Marseilles, it should also be fresh and cool.

The water from the main pipes of Marseilles is in each house, whether occupied by one family or in apartments, taken up by a service pipe to the top of the building, and there delivered into a single cistern, and is checked by a self-acting valve or cock; from this cistern distributing pipes proceed downwards to each floor or each set of rooms. The general arrangements being like those adopted for that part of Paris supplied by the fountain of Gaillon, and also of Genoa where, however, the water, it is said, is delivered by meter.

For all other domestic uses, except drinking, the water is used in its opaline state. For the purpose of rendering it at once pellucid and cool, a form of portable domestic filter has been devised by Captain Amân Vigie, an inhabitant of Marseilles, which is said to act perfectly in the double capacity required of it—namely, that of filtration and of refrigeration. It is of the simplest character, though well calculated for its proposed object. Two vessels of pottery, each holding a few gallons, are prepared so, that one can be steadily superimposed on the other, without cement or fixtures. Into the upper one which has certain perforations in the bottom, coarse siliceous gravel first, and then two finer qualities of sea-sand, all carefully washed, (and sold in that state to the inhabitants), are filled in, and pressed gently down. When the vessel is nearly full, a flat circular plate of pottery, pierced full of small holes, is laid upon the top surface of the sand. This top vessel is glazed inside and out. The lower vessel is made of extremely pourous earthenware, like that of the Spanish *alcarazzas*, and has one aperture at one side near the bottom, with an external neck, to which a length of vulcanized India rubber tube can be adapted. The length of this tube is a foot or so more than the total height of the two vessels when superimposed. In this state the little apparatus is placed upon a convenient stand, beneath a tap or cock leading from the house cistern, and by preference a position for it in a sharp draught of air is preferred. The cock is turned to the extent that experience shows will supply water as fast as it will filter through. The actual mode of working is to turn on the water by hand when the lower vessel or magazine needs replenishment, and so to turn it off when filled; but it is obvious that the supply might be made automatic easily, and equal to the demand at any moment.

The pellucid water passes into the lower vessel, and therein it becomes cooled, the rapid evaporation from its porous sides producing a powerful refrigeration. The india rubber tube from the adjutage of the lower vessel is brought vertically up the side of the apparatus, and the loose end left lying across the top—in that position, obviously no water can pass by it. Whenever it is needed to draw off water, the loose end of the pipe is lowered to the requisite level, and the water flows out into any other vessel held beneath its open extremity.

Thus, without a single close joint or metallic fitment, or valve, or cock, the whole apparatus is complete. It is cheap and simple to the last degree. The aeration of the water is said to proceed in the lower vessel, in virtue of its porous sides, with great vigor, so that drinking water, fully charged with air, and at or below 40° Fah., in the hotest weather, is always commanded.

When the sand, after some weeks' use, has begun to get clogged, it is taken out and thrown away, and a fresh charge put in.

Domestic filtering apparatus is common enough in all parts of Europe, but everywhere that we are aware of is constructed on much more expensive and complex designs than this which we have now described.

In some, sponge is the filtering medium, the objections to which were long ago pointed out by Arago; in others, porous stones, such as Ransomes'; or porous plates, made up of charcoal or coke and baked earth; or woven tissues, &c., form the filtering media. To all these there are objections, in first cost and in use. None of these domestic filters that ever we have seen combine with the advantage of the *Alcarazza* principle of cooling in the recipient vessel. This appears to us to be the greatest merit of M. Vigie's filter.

We make no doubt but that this domestic apparatus may practically be found to work well in the actual *regime* of life at Marseilles, and, after a time, if indispensable, would no doubt be found to do so in England or elsewere. The filter would come to be understood and worked as easily as moderator lamps, or gas lights, or water closets, and a thousand other more complex things are found to work. But we cannot, nevertheless, but regard the necessity for their adoption at Marseilles as a grave blot upon the hydraulic engineering that has procured for it its supply of water, worthy of all praise as it is in point of copiousness. It points to the fact so well insisted on by M. Grimand de Caux, that too much care cannot be bestowed upon the preliminary enquiries that should be always instituted with the utmost rigidity of science, as to the physical and chemical qualities of the sources proposed to be made available by the hydraulic engineer.

Here is a case in which the beneficent results of one of the most magnificent water projects of modern days —if not of the world—are to a serious extent neutralised by the presence of an insignificant quantity of suspended matter.

The mud, chemically considered, is probably by no means deleterious as regards the calcareous constituent —certainly not so either to animals or plants; yet, in the impalpable division in which it is borne along with this Durance water, it is odious to the eye, if not disagreeable to the palate, and fatal to vegetation.

Without impugning the analysis of M. Pisani, we must entertain a doubt that he looked for silica in the water; and we apprehend that part of the clay or aluminous matter may probably consist in reality of minutely divided silex. If so, the confluent opinion of the physicians of all alpine countries, who have had long experience of the effects of the water of mountain torrents, bearing silica in this impalpable condition, is, that it exercises peculiar and highly unwholesome effects upon the animal economy.

It is easy to see to innumerable ways in which opalescent, or slightly muddy water, used for every domestic purpose, with the exception of drinking, must yet be productive of disorder. inconvenience, and loss.

If anything can counterbalance such an evil, in the almost tropical climate (for a large part of the year) of Marseilles, it is the magnificent abundance of the supply.

This plenitude of water, delivered at a commanding altitude, is such, that both sides of every street in the city runs a rivulet of water, by which the kennels are constantly swept of every impurity.

The water-tables at the curb-edges of very many of the flagged footways, are constructed on a peculiar and and excellent plan of great simplicity, which might with advantage be adopted in many places in London and our other great towns.

The line of stone blocks form a solid abutment and curb for the pavement or macadamising, as the case may be. They are solidly bedded and jointed with asphalt. The hollow grooved channel, which is about 10 to 15 inches in each dimension, is wrought out of the stone, and a rabbet is prepared on the inside part of the top bed to receive the covering stone, which so overbands the former, that a wheel or foot, when close to the edge of the footway or kerb, cannot slip into the trough. Everything finds its way, in heavy rain, into the trough, and from its section, solid matters, such as are found on street surfaces, are swept along usually without any stoppage, and into the main sewers. When a stoppage does occur, or during the continuance of nearly dry weather, the channels are cleared by sweeping along them a crooked iron instrument, introduced through the continuous slot.

The stone employed is Apennine, or sub-apennine limestone in heavy blocks. The whole construction seems to stand well, and is exposed in several places to very heavy traffic. This construction presents the advantage of leaving the entire breadth of the roadway from kerb to kerb, at once free for traffic, and free of puddles of nearly stagnant water. It protects the foot passenger from the direful splashing over with mud from the sudden rushing of wheels through the shallow kennel in wet weather, which is commonly one of the sufferings of the London pedestrian, and, by substituting a form of channel which gives a minimum perimeter and maximum depth, it enables offal to be swept

along by the current, that is imperfectly, of not at all, carried along our water kennels.

At Marseilles the writer has himself remarked that in fine weather the water running in these water kennels is frequently perfectly pellucid at the lower parts of the city, and affords another instance not unworthy of notice of how completely opalescent water is deprived of its suspended matter by long-continued agitation in flow, with large surface contact, and aeration at the same time.

THE CHICAGO LAKE TUNNEL.

A few days since the Common Council of Chicago made an inspection of the Lake Tunnel. The *Tribune* says:

"The bottom was reached in safety, and the party stepped out into the void—a long bore, five feet in diameter, and stretching away lakeward, a distance of eleven hundred and twenty feet—nearly one quarter of a mile. A platform raised nine or ten inches from the bottom gave a good foothold, but left a rather humiliating amount of perpendicular room in which to walk. But the party set forward, bent (nearly double) for exploring the farthest recesses of the gloomy vault. 'Twas a long, wearisome creep, and long before the end was reached, the knees and back began to tire, while the elevated temperature—fifty-eight degrees—made it uncomfortably warm.

"People who are accustomed to the idea of cool cellars in summer may be surprised at being told that the temperature at nearly eighty feet below the lake surface is so much greater than above ground, but such is the fact. There is a uniform temperature all the year round at a point about sixty feet below the surface, the average only varying with the latitude; in the latitude of Chicago it is about fifty two degrees; the balance of six degrees being due to the evolution of carbonic acid gas from the lungs of the workmen and the burning lamps. Were not a good system of ventilation in use, changing the air often, the mercury in the thermometer would rise much higher from the operation of the above mentioned cause.

"Down in that work the ventilation is as good as could be desired. A thorough draft is kept up through a large pipe extending the whole length of the work, and the operation of this is needed only to change the air made foul by breathing and boring. The soil through which the miners are digging is remarkably free from those poisonous gases which are so great an obstacle in most underground operations. Only twice have the workmen been troubled with gaseous outbreaks, and but one of those was of such magnitude as to necessitate a suspension of labor.

"At first this work was attended with many difficulties, the shifting sand offered an impediment at the beginning, which was only overcome by the employment of iron cylinders from the upper twenty-seven feet of the shaft; and the pumps clogged and the gearing broke, but now all goes on smoothly—save an occasional strike among the workmen—and the work proceeds nearly as fast as it would above ground. The miners dig out the clay, making a cylindrical hole of about six feet and a half in diameter, loading the clay on little cars, which are then run on a tramway to the shaft, and thence elevated to the open air. They are followed at a distance of a few feet by the masons, who lay the bricks in two courses, packing them into the clay round the lower half of the arch, and filling in with cement on the upper half. The whole is thus made compact, and capable of resisting any pressure short of one of those general upheavals, which in times past have revolutionized the surface of our globe. The whole thing is solid as the rock itself, and there seems no reason to apprehend a collapse either outward or inward. If this work should be finished without accident, it would seem there is no chance for future displacement.

"The work is now progressing at the rate of ten linear feet per day of twenty-four hours, the men being worked in three gangs, each of which takes an eight hours' shift, so that the job is prosecuted night and day. Nearly half a mile will have been finished by the first of May, at which time the now finished crib will be taken out to its destination—two miles from shore—and sunk; the work will then proceed from both ends, and the whole tunnel be finished and in running order by the end of 1866."

THE LATE PROFESSOR SILLIMAN.

At a meeting of the Chemical Society of Columbia College, held on Monday, Dec. 5th, the following resolutions of respect to the memory of Prof. Silliman were passed:—

RESOLVED, That in the death of the venerable Benjamin Silliman an event has occured well worthy of the notice of this society; the life of this Christain gentleman and man of science offering to the student an elevated standard by which to guide his steps.

RESOLVED, That the youthful energy which induced him to prepare himself as a Lecturer on Chemistry, at a period when the facilities for acquiring such were so limited, entitles him to the gratitude of those who now profit by his pioneer labors.

RESOLVED, That by the establishment, in 1818, of the *American Journal of Science and Arts*, he added another claim to the gratitude of the scientific student, and earned a right, universally conceded, to give his own name to that periodical.

RESOLVED, That his life-long example as a polished genial and Christain gentleman is a source of grateful recollection to this Association, as an evidence that the earnest seeker after scientific truth may, at the same time, cultivate the highest religious and social character.

RESOLVED, That the devotion to the highest welfare of his country and the cause of human freedom, displayed even in his latest days, commands the admiration and respect of this society.

RESOLVED. As a mark of respect to this wise and good man, and an incitement to future members of this Association to study his life and character, that these resolution be entered on the minutes of the society and published.

PATENT OFFICE STATISTICS.

The Secretary of the Interior presents in his report the following summary of the operations of the Patent Office for the year ending September 30. During this period 6,740 applications for patents and 989 caveats were filed; 29 applications also were made for the extension of patents previously granted. During the same period 4,843 patents, including re-issues and designs, were issued, and extensions granted. The number of applications awaiting the payment of the final fee required by law before patents can be issued, has largely increased, numbering now over 1,000. The finances of the office are in a prosperous condition, as appears by the following short statement:—

The balance in the treasury to the credit of the patent fund on October 1, 1863, was $37,732 63. The receipts of the office to September 30, 1864, amounted to $230,838 60, making a total sum of $268,571 23. The expenditures during the same period were $212,453 84, leaving a balance of 156,117 39 on hand on October 1, 1864, being $18,384 76 more than the balance as exhibited on October 1, 1863.

It is calculated that about 8,000 dozen pounds of candles per week are used in the mines of Cornwall alone, taking no account whatever of the large consumption in private houses. This would make an annual consumption of about 600,000 lbs. of tallow every year; and the total value of candles used for mining purposes would, at an average of 5s. 3d. per dozen pounds, represent an expenditure of about £13,000 for candles alone.

A Mrs. Egbert, wife of one of the oil-princes, recently forwarded $5,000 to provide a Christmas dinner for the soldiers in the Philadelphia hospitals.

EARTHQUAKES.

A NEW THEORY.

The ancients believe that the sea caused the earthquakes. Experience without sicence may, perhaps, give hints to science without experience. Living for months in no slight fear of these always alarming, and at that time constant visitors, it is impossible not to form some opinion on the matter. I believe, then, by the action of the winds, the ocean is forced occasionally into contact with the realms of fire that occupy the center of the earth, and that the waves, repelled by the flames, generate enormous volumes of steam, which rush furiously along the hollows, conveying with them the lava of those dark regions. This mass of steam-driven lava seeks everywhere to escape, makes for the volcanoes, and on its passage breaks through or violently shakes the crust of the earth where it is weakest. In proportion, then, to their nearness to great volcanoes, or to main channels leading thereto, countries are more or less affected by earthquakes. In a calm, I imagine that the sea may then be retreating from the fires which it may have before approached. Steam may then still be generated, but not with the same violence as when, in the inimitable manner described by Homer, Pluto

"Leaped from his throne, lest Neptune's arms should lay
His dark dominions open to the day."

Comparing ideas with the respected and amiable late Bishop of Gibraltar, at Cephalonia, he assured me that he long entertained the same opinion as to the manner in which earthquarkes originated.—*Viscount Kirkwall.*

PRESERVATION OF IRON IN WATER.—At a sitting of the Academy of Sciences, M. Becquerel read a paper on the preservation of cast-iron and iron in fresh water. He had previously shown that when a plate of either material was in contact with a zinc plate not exceeding the hundreth part of the surface of the former, the intensity of the derived electrical currents on the protected metal (iron) would, in sea water diminish, as the distance from the point of contact of the two metals increased; but, nevertheless, so that the protection afforded by these derived currents would still extend to a considerable distance from the said point of contact. In fresh water there are fewer divided currents on the surface of the metal, a fact which M. Becquerel attributes to the difference of conductability of the two liquids and the degree of chemical action which each exercises on the zinc, since these two circumstances both tend to increase the intensity of the currents M. Becquerel concludes with saying that a pile of 9,837 cannon balls, 12 centimetres in diameter, may be protected from oxydation under water by surrounding it with zinc bands having an aggregate surface of two square metres.

INDESTRUCTIBLE WRITING.—Lucas proposes for this purpose an ink composed of 20 grains of sugar dissolved in 30 grains of water, to which is added a few drops of concentrated sulphuric acid. Upon heating this mixture the sugar becomes carbonised, and when applied to the paper leaves a coating of carbon which cannot be washed off. This stain is rendered more permanent by the decomposing action of the acid itself upon the paper, and thus made, it resists the action of chemical agents. The paper should, after drying, be passed through a weak alkaline solutiou to remove excess of acid.

The long-vexed question of locomotives capable of plying on ordinary roads and streets has been set at rest at Nantes, in France. A locomotive has appeared in the streets of that town, drawing omnibuses, carts, and carriages, and is said to be perfectly manageable, and to present no danger.

THE MINING & PETROLEUM STANDARD AND AMERICAN GAS-LIGHT JOURNAL, is published at Tribune Buildings, No. 1 Spruce st. on the 2d and 16th of every month, and is a recognized official organ of—

LIGHT, HEAT, MINING INTERESTS.

PETROLEUM, WATER-SUPPLY, AND SCIENTIFIC SUBJECTS GENERALLY.

JAMES W. BRYANT, EDITOR AND PROPRIETOR.

W. S. SHERMAN, PUBLISHER.

PROF. C. ELTON BUCK, CONSULTING CHEMIST.

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☞ All communications to be addressed to "The Editor," No. 15 Nassau Street, New York.

AGENTS.

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The Mining and Petroleum Standard

AND

AMERICAN GAS-LIGHT JOURNAL,

PUBLISHED ON 2D AND 16TH OF EVERY MONTH.

JAMES W. BRYANT, ... EDITOR.

MONDAY, JAN. 2, 1865.

BACK NUMBERS WANTED.—We want to complete our files of the Journal, the following numbers, for which we are willing to pay full price.

Vol. II—No.'s 13, 22, 24, 25, 29 and 34.
Vol. III—No.'s 40, 42, 44, 47, 48, 52 and 56.
Vol. IV—No.'s 63, 64, 67, 68, 69, 70, 72, 74, 80, 82, 83.
Vol. V.—No.'s 91, 93, 95 and 96.

Those of our subscribers who do not bind the Journal, would do us an especial favor by forwarding to us any of the above numbers. We are being constantly called upon to furnish back issues of our paper by those who value it for future reference, and we have supplied them until all of the above numbers are exhausted.

☞ The severe illness of our publisher for the last ten days, has delayed the issue of the Journal.

TO OUR SUBSCRIBERS.—There are a few of our subscribers who are in arrears for the current year, and to whom we have sent bills without any response, We request all who are indebted to us to remit the amount due, either in a Bank check to our order (payable anywhere), or in a post office order payable here, not having received several remittances made to us in money. And if any parties remit and do not receive acknowledgement of its receipt in due time we wish them to advise us.

WOOD GAS.—For the past two months we have given especial attention to the subject of generating gas from wood, and had there not have been an unexpected disappointment in the control of some gas works, we would have been enabled to give the result from experiments made under the most judicious and intelligent investigations. They will be delayed for a few weeks. In the meantime we should be very much obliged to any parties who have tried wood in connection with or without hydro-carbon to give us their experience. We are satisfied that where wood, hard pine, or hemlock, can be obtained at a moderate price, that a combination with coal or other carbon will be an improvement in the illuminating power of the gas and at a less cost.

THE NEW YEAR.—The limited personal acquaintance we have with our patrons (owing chiefly to our bad health for several months past) makes even our salutations for the season appear superficial and heartless, but we present them with sincerity. It is natural when engaged in an enterprise which is sustained by strangers even, to feel an interest in them without having any particular circumstances to excite it. But we are happy to say that since we assumed the administration of the journal there have been many incidents through personal association, and by correspondence which have been very agreeable and impressive. In particular, we would refer to the continued courtesy and kind attention received from Mr. Mantz, superintendent of the office of the *Evening Post* (where our journal is printed), as also from other officials there. Undertaking the responsibility of such a journal, without general acquaintances to co-operate with, involved much anxiety, and it induces feelings of real pleasure to believe that our patrons have been satisfied with our management, although comparatively inefficient. We think, as our health is improving, that a better course of numbers will follow.

It has been gratifying also to observe the favorable notices which some of our contemporaries have given us, and to see articles have been frequently copied from our columns in other journals.

Trusting in a continuance of favors we most heartily wish our patrons and friends "A Happy New Year."

NEW YORK, January 1st, 1865.

MR. EDITOR:

Dear Sir: I am encouraged to address to you some suggestions which if they really have the foundation I attach to them, should command the attention of all who desire either to furnish or procure more economical means of converting darkness into light.

One of the prominent "topics of the day" which attracted my attention on my recent return to the United States was the prevalent complaint about the immense cost of gas, and the injustice of the Companies in "charging the Government tax in their bills." "Soulless and irreponsible corporations" is all the cry, no regard being paid to the immense increase in the cost to the Gas Companies, of all the materials used in their operations. Under these circumstances it is clearly incumbent upon the said Gas Companies to examine critically any means proposed, however questionable they may consider such means to be, of producing gas in greater quantity or of superior quality from a given quantity of material. Many months since a plan occurred to me, the development of which would, I believe, lead to economical results.

Clay retorts are now universally employed in all large gas works. These clay retorts oppose great resistance to the conduction of heat, as is well known. The consequence is necessarily that much time is required for the transmission of the heat from the outer to the inner surface of the retort. This difficulty does not occur with iron retorts, but unfortunately (for gas manufacturers) iron is a combustible material.

Now let us consider what the effect must be upon such a clay retort when a fresh charge is introduced. Will there not be a sudden and immense reduction of the temperature of the interior clay surface? Hence it appears to me the great production of tar at the outset of the operation, during the considerable period of time which must elapse before the restoration of the balance of temperature between the outside and inside of the retort. During this period there is going on in reality a distillation of *Coal Oil*, and necessarily therefore a highly important loss of luminiferous hydrocarbon gases, the generation of which requires a much higher heat.

How are we to prevent this loss of material at the outset? My plan contemplates the prevention of the great and sudden temporary reduction of temperature which I have pointed out. I believe that if a small portion of the charge, or, which is practically the same thing, a small portion of the tar vapor were caused to undergo combustion *in the interior of the retort* immediately after the introduction of the charge, the whole body of the retort might be filled with a volume of intense flame which would render the temporary cooling of walls by the contact of the cold material of the charge impossible. The result it appears to my mind would be the almost total prevention of the waste of gas—generating constituents of the coal, and the almost certain increase, both in volume and richness of the gas.

The means I propose to adopt are simply the introduction immediately after the fresh charge has been put in and the retort closed of a jet of highly heated air. It is true that in this way a small quantity of nitrogen and carbonic-oxyd would pass off with the gas, but I cannot resist the belief that the effect of this dilution would be insignificant compared with the beneficial effects of the increased richness of the gas in luminiferous hydrocarbons. The jet of hot air I would of course introduce at the posterior end of the retort, that furthest from the stand pipe. If any tar were still produced it could be made available in this operation by soaking lumps of coke in it and laying them at the end of the charge before introducing it into the retort. This tar would then be set on fire by the hot air and furnish the body of flame required to carry out my idea without waste of the charge itself. I could enlarge greatly upon this theme, but this must suffice at present.

HENRY WURTZ.

GAZLAY'S PACIFIC MONTHLY.—We welcome the issue of this journal as a thing wanted to fill a place amongst our literary works. It is surprising that an enterprise so necessary, and fraught with so many elements of great pecuniary as well as literary success, should have been so long dormant. True that it required peculiar talent and personal experience to undertake and conduct such a work with proper spirit and intelligence, but in the hands of Mr. Gazlay and his co-worker, J. Penn Curry, Esq, we can have no fears but *Gazlay's Pacific Monthly* will soon rank as one of our most popular journals. The character of the contributors named, guarantee sterling and intellectual articles, and many a stray writer on the Pacific will undoubtedly send his "scraps and scribblings" to his old and genial friends. The circulation will undoubtedly be very extensive, it being a "specialty" of intrinsic worth. This first number is creditable in style, type and contents. The office is at 34 Liberty street.

EAGLE GAS STOVES.—In our columns we advertise the Patent Eagle Gas Cooking and Heating Stoves, manufactured and sold at 474 Broadway, by the "*Eagle gas Stove manufacturing Company.*"

These stoves have for some time past been manufactured only by H. D. Blake at the same place, but the great success which followed their introduction to the public induced the formation of a company to carry on the business.

The great variety of patterns and devices for different purposes which are manufactured, exceeds the power of description, the eye alone can understand their valuable adoption to the wants of the people. Convenience, economy and cleanliness are combined. The prices are reasonable and the continual demand for them is the best evidence that they give satisfaction. The company have descriptive catalogues for distribution.

GAS COMPANIES REPORTS.—We will feel indebted to any gas companies who will furnish us copies of their reports, and especially do we desire an analysis of their gas on or about the 1st January. We cannot promise to give publication to them all, but will select such as we think will be most valuable or interesting.

An oil millionaire, out of gratitude to the source whence his wealth was derived, and with a desire to keep it before his mind, has had a complete set of table equipage made in Philadelphia, of china and glass. The embellishments of the plates, dishes and tureens are *fac similes* of the apparatus used in producing petroleum. The dishes bear on the center, decanters, wine goblets and tumblers are alike engraved with the insignia of petroleum. The completed ware is a curiosity. Nothing like it was ever seen in those parts.

GREAT DEPOSIT OF LEAD SLAG IN GREECE.—At the Imperial Geological Institute of Vienna meeting, on Aug. 16, Baron Von Hingenau stated that at the lead mines of Laurion, in Attica, worked for many centuries but now abandoned, there is an accumulation of slag estimated at about 2,000,000 tons, which, according to assays made at Marseilles, produces on an average from 6 to 10 kilos of lead and 3 grammes of silver per 100 kilos, equals from 6 to 10 per cent. of lead, containing from 6 to 9½ ozs. of silver per ton. A French company has undertaken the working of this slag, paying about £1,800 to the Greek Government, and an annual rent of about £75 to the owners of the ground. Buildings, furnaces, engines, &c., have been erected for metallurgical operations at a cost of 500,000fr. (£20,000).

☞We notice among the list of Patents one granted to Mr. Charles M. Cresson of Philadelphia, for Gas Regulating Valves. Also, one to Mr. J. W. Smith, of Washington, D. C., for the manufacture of Coal Gas for Illumination.

IMPORTANT NOTICE.

To ADVERTISERS.—Our paper offers a superior medium as an advertising agent, to all those who manufacture or sell machinery or appliances of any kind for Gas, Mining, Water, Sewerage, the production or purification of Oils, &c. &c., not so much on account of a wide-spread circulation, as from the fact that it goes directly to the hands of those who are constantly using and requiring machines and improvements for these branches, and who look hrough our columns for information where to procure them. The class of people who read our paper not only peruse our pages of reading matter, but read the advertisements as well, for the reason that they are directly interested in all things pertaining to their business. We therefore ask, with confidence that we can do them justice, all parties having machinery or improvements of any kind for either of the objects to which our paper is devoted, to send in their advertisements and avail themselves of these advantages. It will be observed that our terms for advertisers are very reasonable.

NEW YORK MINING EXCHANGE.

NEW YORK, Dec. 31, 1864.

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Aztec	7⅛	9	Benton	1	1⅛
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Canada	3¾	4	Great Western	—	8
Carp Lake	3	5	Hope	—	9
Central	65	70	Isaac's Harbor	¾	⅞
Columbian	—	24	Manhattan	—	9
Copper Falls	34⅛	38	Mariposa	44	44¾
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Dacotah	—	5½	New York	2⅛	3
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Evergreen	18¾	20	Quicksilver M'g Co	81	82
Flint Steel River	12	13½	Rocky Mountain	—	10½
Frue	2¾	5	Smith & Parmelee	7	12
Grand Portage	—	—			
Hancock	12¾	14	***Coal Stocks.***		
Hamilton	—	6	American	98	100
Hilton	5	6	Ashburton	—	25
Hudson	1	2	Central	62	65
Huron	32	33	Cumberland	61	62
Indiana	8¾	9¾	Del. & Hud. Canal	206	208
Isle Royale	20	20½	*Hampshire & Balt.	104	110
Keweenaw	—	6	Pennsylvania	213	215
Knowlton	7	10			
Lafayette	1	2	***Lead Stocks.***		
Manhattan	—	—	Bucks County	⅝	¾
Mendota	—	—	Clute	1⅝	1¾
Merrimac	4¾	5⅛	Erie	—	20
Minnesota	33	37	Macomb	3⅛	5
New York, A. P.	2	3⅛	Plancentia Bay	1¾	1⅞
N. J. Consolidated	4	4⅛	Sussex	¾	⅞
Norwich	—	6	Wallkill	3⅛	6
Ogima	5	6¾			
Ontonagon	3	4	***Iron Stocks.***		
Penn	—	11⅛	Copake	8	10
Providence	1¾	2	French Creek	⅝	1
Quincy	96½	98	Teal Lake	4½	6
Reliance	1⅛	2⅛			
Rockland	12½	14	***Miscellaneous.***		
Superior	8¾	9	Rutland Marble	17	20
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TO PETROLEUM COMPANIES AND OTHERS.—A practical business man, thoroughly acquainted with the construction and operation of machinery, with much experience in the erection of factories, boring of artesian wells, and the working of Petroleum and other oils, and who is competent to make his own plans for buildings, machinery, &c., would engage as agent and practical manager or join parties about engaging in the Petroleum business. Address for two weeks. PETROLEUM, care Joy, Coe & Co., Tribune Buildings, New York.

TO OIL COMPANIES.

An experienced Railroad Contractor desires a situation as Superintendent of an Oil Company. Has no family, and is willing to go to any section of the country, and can furnish the best references. Address,

FALKNER McMURTRIE,

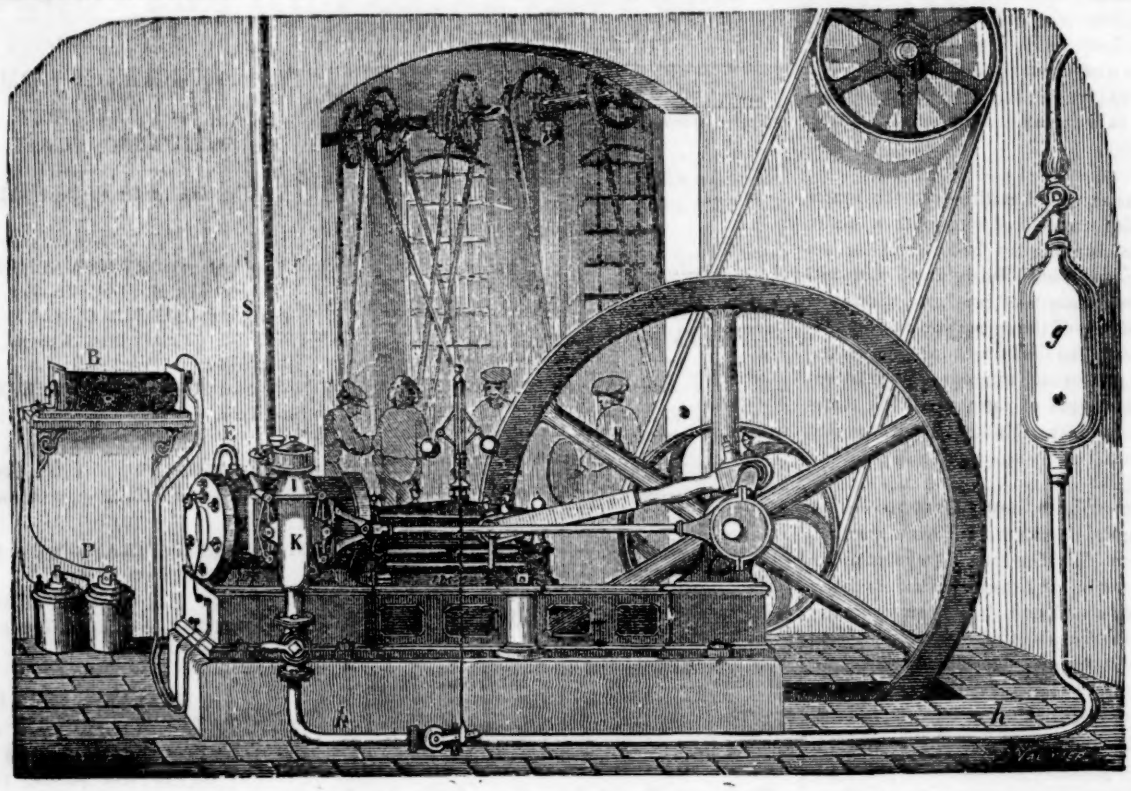
1015 Vine street, Philadelphia.

U. S. MAIL LINE FOR CALIFORNIA,

via Panama, under convoy of a United States war steamer throughout the Atlantic voyage.

For freight or passage apply to

D. B. ALLEN, No. 3 Bowling Green



MOTEUR—LENOIR.

LENOIR GAS ENGINE.

This is a horizontal engine, in which a piston, by a connecting rod drives a horizontal shaft.

The gas enters by the pipe "h" from the regulating reservoir "g," (made of vulcanized india rubber,) which regulates the feeding and the branches connected with the gas-pipe.

The tube, K, receives the gas conveyed by the pipe "h," and conducts it to the valve, which opens and closes alternately, by means of a rod moved by an eccentric wheel fastened to the end ot the shaft.

Two of Bunsen's piles, P, sufficient to produce the electricity are placed at a little distance from, and in communication with a Ruhmkorff electric apparatus, B. The electric current of this apparatus is conducted by means of insulated wires to the electricity distributor "m," placed on the front of the frame, while the current of electricity and its arrival at the inflammator, inserted at each end of the cylinder, is directed by the movement of the piston-rod, which, by an ingenious combination, impels a small movable slide before the distributor.

The burnt gas, after having performed its functions in the machine, escapes, by means of a valve, through a pipe, S, and the water designed to cool the interior of the cylinder enters through a double passage, by means of a pipe situated near the escape-valve, and goes out by the pipe, E.

A two horse and a half horse Engine are now in practical operation at the Dry Dock Iron Works, No. 345 East Fourth street, near East River, New York, where they are being manufactured, and those interested are invited to call and examine them.

THE LENOIR GAS ENGINE

Requires no Fire and makes no Smoke,

No Noise, no Dirt, and is thoroughly safe.

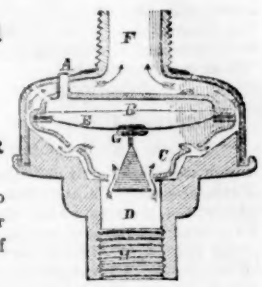
It is propelled by the expansion of Air, dilated by the combustion of Gas within the cylinder, ignited by the

ELECTRIC SPARK.

NOTICE TO GAS COMPANIES AND GAS CONSUMERS.

THOMPSON'S PATENT GAS CONTROLLER,

The only Self-Acting Gas Controller, Regulator, and Burner Combined which has ever been invented, or known to sci nce.



THE PRINCIPLE UPON WHICH THE THOMPSON'S AUTOMATIC GAS CONTROLLER works is one well known to mechanics, and is simple in its operation.

Within the circumference of a small cylinder below the burner is placed a conical valve attached to a movable diaphragm. The diaphragm rises or falls as the pressure of gas from the pipe is lesser or greater, and the valve acts upon the valve-seat with such regularity of movement that in a difference of from five-tenths of an inch pressure to five inches the variation in flame is hardly perceptible.

The simplicity of its machinery and the nature of the material used in its construction insure its regular action and durability.

In consequence of the uniform quantity of gas which passes the Controller to the burner, there is no waste, and a steady, soft flame is produced, which is important to all who read, write, or work by gas light. The unsteady flickering blaze which invariably exists when the pressure of gas is beyond the requisition for consumption, has injured the sight of thousands who have been subjected to it.

For street lamps these Controllers are especially valuable, because the pressure varies materially during the night, and in consequence there is a waste of gas, and the light variable.

Improvements have lately been made in the mechanism of the Controller which makes them almost a perfect meter to each burner, and they are now offered to the public with more confidence than ever before.

Reference is permitted to the following named gentlemen—

Col. CHAS. ROOME, President Manhattan Gas Company, N. Y.
C. H. SANDS, Esq., President Metropolitan Gas Company, "
J. H. ADAM, Esq., President New York Gas Company, "
PETER COOPER, Esq., Cooper Institute, "
JOHN A. DUFF, Esq., Olympic Theatre, "
GEO. H. KITCHEN, Inspector of Gas Meters, N. Y.
A. L. BOGART, Esq., Gas Engineer.
Col. J. A. SABATTON, Engineer Manhattan Gas Company.
Col. A. J. WHITE, Engineer Metropolitan Gas Company.
J. K. SIMPSON, Esq., Engineer Cooper Institute.

Persons interested are invited to call at the manufactory, 52 Greene street, where they can see the operation by pressure guage and test meters.

M. L. CALLENDAR, Agent
Office, 52 GREENE STREET.

THE AMERICAN METER CO.,

Organized under the General Manufacturing Laws of the State of New York.

SAMUEL DOWN, PRESIDENT. HENRY CARTWRIGHT, VICE PRESIDENT. RICHARD MERRIFIELD, SECRETARY AND TREASURER.

TRUSTEES.

SAMUEL DOWN, WILLIAM HOPPER, R. H. GRATZ, HENRY CARTWRIGHT, RICHARD MERRIFIELD.
THOMAS C. HOPPER, *Superintendent at Philadelphia.*

This Company is now prepared to furnish WET AND DRY GAS METERS, STATION METERS, GOVERNORS, PRESSURE INDICATORS & REGISTERS, SERVICE and METER COCKS, and all other articles in their line appertaining to the use of Gas-Works.

The combination of Mechanical and Scientific Skill, and the long experience of the several members of the Company, is a sure guarantee of durability, acur acy and excellence of workmanship. Orders addressed

AMERICAN METER COMPANY,

512 WEST TWENTY-SECOND STREET, NEW YORK,
ARCH AND TWENTY-SECOND STREETS, PHILADELPHIA,
1 BARRETT STREET, BOSTON, will meet with prompt attention.

HARRIS & BROTHER,
PRACTICAL GAS METER MANUFACTURERS

Continue, as heretofore, at their old Establishment,

No. 1117 CHERRY ST., PHILADELPHIA,

TO MANUFACTURE

WET AND DRY GAS METERS and all kinds of GAS APPARATUS, and furnish all articles appertaining to the use of Gas Works.
OUR WORK WARRANTED—Satisfaction Guaranteed. Orders respectfully solicited, and promptly attended to, by—

HARRIS & BRO.
No. 1117 Cherry st., Phila.

GEO. H. KITCHEN & CO.,
NEW PATENT
GAS APPARATUS
For Country Residences, Public Buildings, &c.,
FROM $300 UPWARDS.
EVERY DESCRIPTION OF GAS FIXTURES.
Gas Fitting in all its branches.
561 Broadway,
NEW YORK.

WORTHINGTON'S STEAM PUMPS, extensively used by Gas-Light Companies. For Sale at greatly Reduced Prices.

Also, a new and highly successful Pump, driven by water pressure, requiring no attention or repairs, and the most economical water motor yet constructed.

Patent GATES, for Water and Steam-stops.
HENRY R. WORTHINGTON,
61 Beekman street, N. Y.

GLYCERIN
FOR
Filling Wet Gas-Meters,

Cheaper than Whisky or any other substance.

We have furnished the Cincinnati Gas and Coke Company 300 barrels Glycerin, for filling their wet meters, and are now ready to supply other Gas Companies at the lowest cash prices.

We warrant our Glycerin not to corrode the meter metal, nor to freeze at the lowest ordinary temperature, nor to evaporate.

HARTMAN & LAIST,
Manufacturing Chemists,
Cincinnati, O.
Office 64 Sycamore.

Agent in New York, Paul Balluff, 95 Malden Lan

WOODEN PURIFYING TRAYS.

PATENT
Conically Slotted Solid Wood Sieves
FOR GAS PURIFIERS.
CAUTION
TO
GAS MANUFACTURERS.

The Conically Slotted Solid Wood Tray was patented 21st October, 1862, by N. O. Hawhurst, assignee of Wm. Combe, and all persons are cautioned against purchasing such trays of R. G. Hunt, or any other person except the subscriber, as it is a direct infringement of said patent. The following companies are now using these trays.

Manhattan, New York,
Williamsburgh,
Brooklyn,
Albany,
Baltimore,
Philadelphia,
Chicago.
Louisville,
And numerous

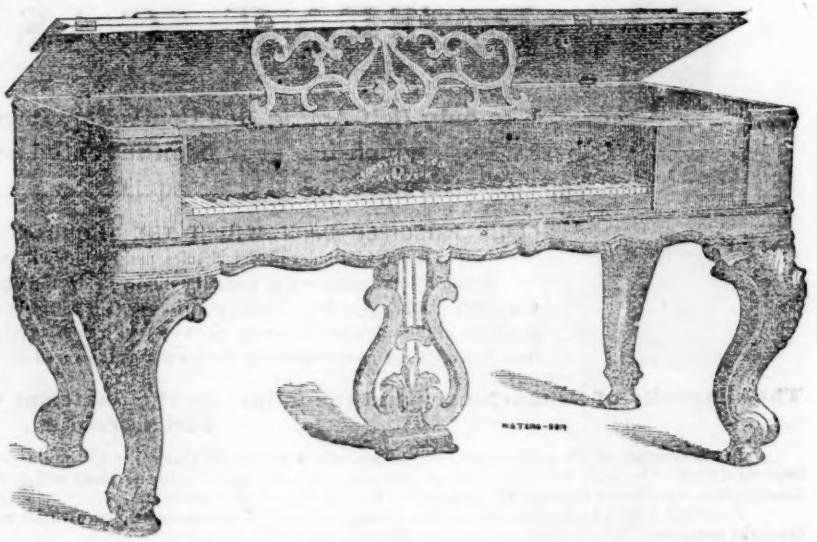
Orders received by mail or otherwise
JOHN L. CHEESMAN,
147 Ave. C, New York

GROVESTEEN & CO.,

PIANO-FORTE MANUFACTURERS,

499 BROADWAY, NEW YORK.

The attention of the public and the trade is invited to our New Scale Seven Octave Rosewood Piano-Fortes, which for volume and purity of tone are unrivalled by any hitherto offered in this marked. They contain all the modern improvements, French, grand action, harp pedal, iron frame, over-strung bass, etc., and each instrument being made under the personal supervision of Mr. J. H. Grovesteen, who has had a practical experience of over thirty years in their manufacture, is fully warranted in every particular.



THE "GROVESTEEN PIANO-FORTE"

Received the highest award of merit over all others at the Celebrated World's Fair!

where were exhibited instruments from the best makers of London, Paris, Germany, Philadelphia, Baltimore, Boston, and New York; and also at the American Institute for five successive years, the gold and silver medals from both of which can be seen at our warerooms.

By the introduction of improvements we make a still more perfect Piano-Forte, and by manufacturing largely, with a strictly cash system, are enabled to offer these instruments at a price which will preclude all competition.

PRICES.

No. 1, Seven Octave, round corners, Rosewood Plain Case, $275.
No. 2, Seven Octave, round corners, Rosewood Heavy Moulding, $300
No 3, Seven Octave, round corners, Rosewood Louis XIV, style $325, a fac-simile of the accompaning cut.

TERMS—NET CASH, IN CURRENT FUNDS. Descriptive Circular sent free.

WEST'S IMPROVED PUMP.

Anti-Freezing, Double-Acting, Forcing, and Lifting.

These Pumps have now been in general use a number of years, and give better satisfaction than any other, and are recommended as

THE BEST!

by CAPTAIN ERICSSON and other eminent engineers. We can refer to thousands using them, an guarantee that all will recommend them. They are more simple in construction, and work easied and cost less than all others.

"Our readers will find the double acting, improved pump of J. D. West & Co., one of the best in the market. It is very simple, works to a charm, so that any child may use it; throws a steady continuous stream, and does not freeze in the coldest exposures, and is unusually cheap. We say this knowingly, and give the testimony of our own accord, without the knowledge or request of the proprietors."—*New York Evening Post, July 1st*, 1863.

"J. D. WEST & CO.: We are pleased to state that the Pumps we had of you about a year ago, have been in constant use, twelve hours each day, and raise for the use of our woolen factory, about 180 gallons per minute. They work with but little power, compared with pumps we have used before, and do not get out of repair, and are satisfactory in all respects.

"DUNLAP MANUFACTURING CO."

Solon Robinson to the Farmers' Club.

Jan. 23.

"No farmer who owns a well or cistern can possibly afford to be without an iron pump. It should be a force suction and force pump—a perfect little fire engine—such a one known as 'West's Improved Pump.' I speak of this Pump because I happen to know it....to be very simple, durable, powerful and cheap, and it don't freeze up, nor get out of order once a year....I know this, and think I may be doing the farmers good by speaking of it....A boy ten years old can work it, and throw a continuous inch-and-a-quarter stream....It can be made to work in deep wells as well as in shallow ones."

"GREAT NECK, L. I., 1860.

"I have used this Pump for one summer and winter, exposed to the northwest wind coming over Long Island Sound, being the coldest possible exposure, and at no time did it freeze, nor were we unable at any time to pump water with great ease.

H. B. MC ILVAIN."

"The undersigned having to use "West's Improved Pumps," cheerfully recommend them as simple, durable, and powerful in raising and throwing water, and for their ease of action, security against frost, and low price, we believe them superior to all others.

"WARREN LELAND, Met. Hotel, N. Y.
"J. W. POMEROY, Yonkers, N. Y.
"JOHN MESEREAU, N. Y.
"DOMINICK LAWRENCE, Westchester."

From the New York Observer.

"We have had in use for months past one of West's Pumps, which has given us more satisfaction as a force and lifting pump than any we have ever used. It is one of great power, and well adapted for ship's decks, mines, factories, greenhouses, graperies, etc. *The Mining Chronicle and Railway Journal* says: 'It is recommended for its extreme simplicity of construction, great strength, and consequent durability and cheapness of repair. There is no stuffing-box—the pressure being held by a cup packing, like that upon the working-piston, working in a cylinder, fitted for the purpose within the upper air chamber—which we think a great improvement, as stuffing is so liable to be deranged and leak under strong pressure, to say nothing of the loss by friction incident thereto. It has also two air-chambers; thus the action of the valve is cushioned upon both sides by air—preventing water-hammer and vacuum-thump. The valves are very accessible and simply and cheaply repaired. They work much easier than any pump we have ever seen; the 4-inch cylinder being worked by children in wells 100 feet deep, and as they are extremely cheap, as well as simple and strong, we freely recommend them.'"

"CAMBRIDGE MINE, N. C., June 15, 1863.

"J. D. WEST & CO.—Gents: The Pump which I ordered for our mine is received, and put to work in our underlay shaft, which we are sinking. We find that one man will, with ease, lift 50 gallons per minute. We lifted in three and a half hours all the water in the shaft, which measures seven by twelve feet and thirty feet deep, and it was full when we commenced. It answers our expectations in every respect, and our workmen are highly pleased with it. It will do great service with but trifling expense for repairs.

"Yours, respectfully, BURR HIGGINS."

"This may certify, that I have been using, at my manufactory, for the last four years, 'West's Improved Pumps.' I now have in use three of said Pumps, one of which is kept constantly at work, 24 hours of each day (save Sundays), and has been running for the past two years. I pronounce them, unhesitatingly, the best Pumps that have been brought to my notice, having used many others previously. They are simple in their construction, and not easily disarranged.

"N. Y., Oct. 10, 1859. JAS. A. WEBB."

We have plenty more such certificates, but think these are enough. For Pumps, Hose, Pipe, etc., address or call upon

J. D. WEST & CO., 179 Broadway, New York.

Orders may be sent through the AMERICAN ADVERTISING AGENCY, 389 Broadway.

LILLIE'S

CELEBRATED

Chilled and Wrought Iron Safes,

WROUGHT IRON FIRE-PROOFS,

LOCKS AND VAULT DOORS.

These Fire-Proofs are manufactured to supply a demand for Security Against Fire, less expensive than my celebrated and superior Chilled and Wrought Iron Burglar and Fire-Proof Safes.

They furnish similar and equal security to the Safes generally manufactured in the different cities, but are SUPERIOR to them in their Fire-Proof qualities and durability, the iron being effectually protected from rust in any climate, and the Fire-proof not subject to lose its utility by age. This is an important advantage gained to the purchaser, as Safes often rust out and become worthless in two or three years.

To substantiate my position, these purchasing these Fire-Proofs are at liberty, by giving me due notice of time and place of trial, to test them by fire with any other Safe of the same size; and should they not prove superior, I will refund the money, or a new Fire-Proof, as the purchaser may decide.

LIST OF SIZES & PRICES OF WROUGHT IRON FIRE-PROOFS

No.	Outside. Height.	Width.	Depth.	Inside. Height.	Width.	Depth.	Price.
6	40	31	27	31	21	15	$150
5	34	21	26	24	21	14	125
4	31	27	25	22	18	13	110
3	30	24	24	21	15	12	100
2	28	22	23	20	14	12	75
1	24	19	20	17	11	10	50

Sample of Fire-Proof Safe at Office of the Am. Ad. Agency, 389 Broadway, N. Y.

PRICE LIST.

LILLIE'S CELEBRATED CHILLED & WROUGHT IRON SAFES.

BANK, FIRE, AND BURGLAR SAFES.
Folding Doors, D Lock.

No.	Outside. Height.	Width.	Depth.	Inside. Height.	Width.	Depth.	Price.
	In.	In.	In.	In.	In.	In.	
1	66	50	29	54⅝	39	18	$950
1½	59	50	26	48	39	15	800
2	53	41	27	42⅝	33	15	600

MERCANTILE F AND B SAFES.
Folding Doors and Monitor Locks.

3	50	42	27	40	32	16	$500
4	46	42	27	36	32	16	450
4½	38	46	27	28	36	16	450
5	42	38	27	31⅝	27½	15	350

Single Doors and M. Lock.

6	38	35	26	27⅝	23½	15	$250
7	34	31	26	24	21	14	200
8	31	28	24	21	18	13	175
9	30	24	24	21	15	12	140
10	26	22	22	19⅝	18½	12	120
11	24	20	18	17	17	10	100

HOUSE SAFES

SIDE BOARD		$600
DINING ROOM		350
PANTRY (No. 1)		275
PANTRY (No 2)		150
DUODECAGON BANK LOCK		100
MONITOR SAFE	do.	50
SAFE	do.	10

NATIONAL BANK SAFES,
With 2 Inside Burglars and 1 D and 2 M Locks.

No.	Outside. Height.	Width.	Depth.	Inside. Height.	Width.	Depth.	Price.
	In.	In.	In.	In.	In.	In.	
1	68	53	35	55	39	18	$1,200
2	61	50	35	48	39	18	1,050
3	57	47	35	42⅝	33	18	900

BANK VAULT BURGLAR SAFES,
With Folding Doors and D Lock.

0	68	53	27	64	48	20	$1,000
0½	61	53	27	55	46	20	800
1	57	47	27	49	40	20	600

BANK VAULT BURGLAR SAFES,
Single Doors and D Lock.

2	53	32	26	49	28	19	
3	42	36	22	38	32	18	400
4	36	31	20	32	27	16	30
5	30	24	18	26	20	14	2

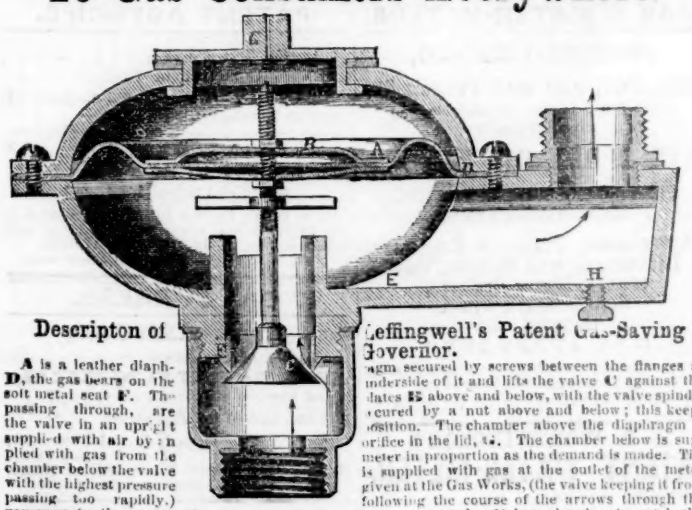
BANK VAULT DOORS AND FRAMES,
D and S Lock.

No.	Height clear.	Width clear.	Depth adjustable.	Price.	Weight.
	In.	In.	In.		
1	72	27	20	$400	3,000
2	72	27	20	275	1,500

Orders received and filled at net cash prices, by the AMERICAN ADVERTISING AGENCY, 389 Broadway, New York. All Safes shipped from Troy free of cartage.

Business Depart., E. ALVORD. *Corresponding Depart.*, FOWLER AND WELLS.

To Gas Consumers Everywhere.



Descripton of Leffingwell's Patent Gas-Saving Governor.

A is a leather diaph- ragm secured by screws between the flanges at D, the gas bears on the soft metal seat F. The underside of it and lifts the valve C against the passing through, are dates E above and below, with the valve spindle the valve in an upright secured by a nut above and below; this keeps supplied with air by an position. The chamber above the diaphragm is plied with gas from the orifice in the lid, a. The chamber below is sup- chamber below the valve meter in proportion as the demand is made. The with the highest pressure is supplied with gas at the outlet of the meter passing too rapidly.) given at the Gas Works, (the valve keeping it from governor to the outlet where the following the course of the arrows through the distribution pipe is connected. E is a chamber to catch the rip, H is the o ... f said chamber, at which point, if the drip troubles its action, a syphon is attached which c ... it off.

STURGES & FROST, (MANUFACTURERS AND PROPRIETORS FOR THE UNITED STATES OF LEFFINGWELL'S PATENT GAS-SAVING GOVERNOR,) solicit attention to the above instrumen which the cut represents. It will positively lessen your gas consumption **15 to 40 per cent** without diminishing, but greatly improving, the light, which is done entirely on scientific principles easily comprehended.

The above facts are demonstrated by thousands of consumers who have them in practical operation in differen parts of the Union. By sending two three cent postage stamps to the proprietors, No. 9 Mechanic Street, Newark, N. J., the GAS CONSUMERS MANUAL will be sent, containing price of the above Governor, full information with regard to the waste of gas, its causes and how remedied, an almanac for the years of 1864–5–6 and 7; also, a diary suitable for any year, together with certificates and references of many who have the Governors in use.

Try it by all means, it will not fall you.

Each Governor is Warranted Perfect.

STURGES & FROST.

☞ As no QUICKSILVER is used, Gas Companies will find it to their interest to favor its adoption among their consumers.

PRINCE'S METALLIC PAINT,

AN INDESTRUCTIBLE COATING FOR

IRON, TIN, and WOOD.

It consists of seventy-two parts Oxide of Iron, and twenty-eight parts Cement Lime Stone in the one hundred pounds.

It has much more body than red or white lead. It is warranted perfectly water and fire-proof and to withstand a greater heat on metals, without scaling, than any other paint in use.

It is a perfect cover for all kinds of iron, tin, or wood-work, out-houses, and canvas coverings. prevents and arrests the corrosion of metals, and is not affected by the action of salt, gases, acids or ammonia.

It hardens under water, as has been fully demonstrated by its application to gas-holders, by many of the largest gas companies in the United States; which companies having thoroughly tested its properties as herein claimed, pronounce in its favor over any other paints in the market, even though sold at double its price.

As a coating for patterns of iron or wood, when mixed with shellac, it is much superior to beeswax, oil, or shellac alone, as has been proven at the large founderies in the country.

For patching boilers and making joints, it is considered superior to red lead, or any other preparation.

For cleaning metals it takes the place of crocus, rouge, and emery, being better and cheaper.

This Paint requires no more oil than dry lead or zinc, and much less than the ordinary mineral paints. It is free from any waste, and possesses a spreading and covering power unequaled.

Terms, by the Barrel or Half Barrel, Four Cents per Pound.

A liberal discount made to parties purchasing by the ton.

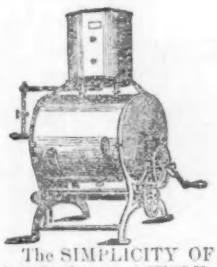
A Barrel or Ton will be forwarded to any gas companies desirous of testing its qualities, for which there will be no charge if it does not give entire satisfaction as being the cheapest and most durable of all other Paints in the market.

Also, Prince's Imperial Black Paint, and Prince's Protoxide of Iron.

DANIEL SLOAN, General Agent,
115 LIBERTY STREET, NEW YORK.

Local Agents—S. R. WILLIAMS, 204 South Front st., Philadelphia.
CALVIN GAY, 29 Doane st., Boston.

DRAKE'S
PATENT
AUTOMATIC GAS MACHINE.



THIS MACHINE, which has been in constant use for more than two years, is now acknowledged to be the

Most Convenient, Simple, and Efficient Method

OF LIGHTING BUILDINGS OF ALL KINDS, out of the reach of regular gas-works, ever brought to public notice.

The SIMPLICITY OF THE APPARATUS, its ENTIRE FREEDOM FROM DANGER, the LITTLE ATTENTION REQUIRED, the EASE WITH WHICH IT IS MANAGED, and THE CHEAPNESS and SUPERIORITY OF THE LIGHT, has gained for it the favorable opinion of those acquainted with its merits.

The Machine takes up but little room; no disagreeable odor is experienced in its use; no fire is applied to the apparatus at all; it can be attached to ordinary gas-pipes used for coal-gas, and is burned through the same kind of fixtures.

These Machines are manufactured in Boston, by the AUTOMATIC GAS-MACHINE CO., and are for sale at their Store, 78 Washington Street, Boston, and also at the Agency, MITCHELL, VANCE & CO.'s, No. 620 Broadway, New York

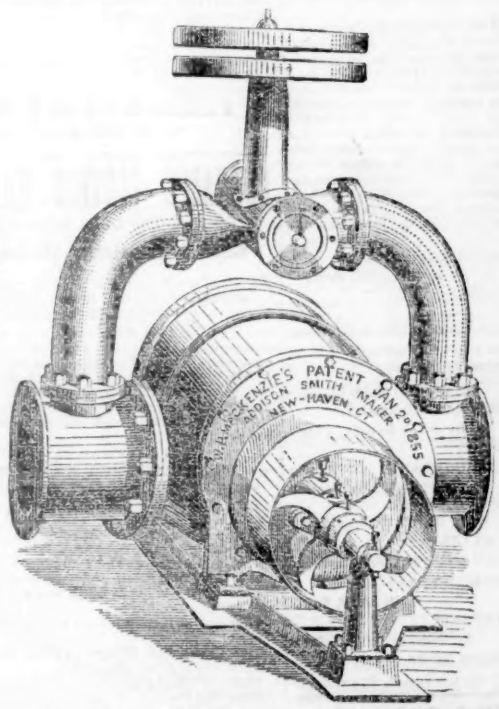
For further particulars, address—

MITCHELL, VANCE & CO.,
620 BROADWAY, NEW YORK CITY.

SMITH & SAYRE,

Sole Proprietors and Manufacturers of

THE MACKENZIE PATENT GAS EXHAUSTER AND COMPENSATOR.



They are made to pass from 4,000 to 150,000 cubic feet of gas per hour; will increase the production and illuminating power of the gas, and add very much to the durability of the retorts, either clay or iron. The Compensator obviates entirely the necessity of water-joints, is compact, durable cleanly, not liable to get out of order, self-acting, quiet, and certain in its operation.

We are also sole proprietors and manufacturers of the

MACKENZIE PATENT BLOWER, PATENT CUPOLA AND SMELTING FURNACE.

The Blower is a Force Blast machine, durably built, and can be driven with one-third the power required to drive the ordinary Fan. The Cupolas are manufactured in sizes to melt from 1 ton to 20 tons per hour, will save one quarter of the time required by the old style Cupola, and 33 per cent. fuel. Address SMITH & SAYRE, 458 Broadway, New York.

THE
STANDARD
Gold Company
OF COLORADO.

DIRECTORS,
ROBERT BOWNE,
EDWARD WILLIS,
LIVINGSTON SATTERLEE,
ETHAN ALLEN,
S. A. BANKS,
SYLVESTER TAYLOR.

President, ROBERT BOWNE.
Secretary, F. A. MITCHEL.

MINES on FISK LODE,
BOBTAIL LODE,
GROUND HOG LODE,
ENTERPRISE LODE,
and others,

In all, 8,625 feet (linear), and large water powers and mill sites

Capital issued, 40 000 shares, at $10 per share.

A limited number of shares are offered at the low SUBSCRIPTION PRICE (having been reserved for their customers), by

WILLIAMS & MITCHEL, 12 Wall Street.

SAFEST AND CHEAPEST SYSTEM OF INSURANCE.

WASHINGTON
INSURANCE COMPANY,
172 BROADWAY,

Cor. Maiden Lane, NEW YORK.

CASH CAPITAL, - - -	$400.000.
Assets, June 1, 1864, - - -	600.000.
Scrip Dividend, 1863, - -	60 per Cent.
Scrip Dividend, 1862, - -	60 per Cent.
Scrip Dividend, 1861, - -	60 per Cent.

The Policies entitled to participate receive 75 per cent. of net Profits.

Insures Buildings, Merchandise, Furniture, Rents, Leases, against loss or damage by FIRE, and MARINE RISKS on LAKES, RIVERS and CANALS.

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The insured receive seventy-five per cent. of the net profits annually, without incurring any liability. When preferred, a discount will be made in lieu of participation in profits.

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Scrip Dividend of 1862, - - 50 per cent.
Scrip Dividend of 1863, - - 50 per cent.

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GENERAL
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Purchases to order ANY article wanted from New York, (or from Europe,) for ladies' or gentlemen's use or wear,—comfort or luxury—from a cameo to a cashmere—a seal-ring to a steam-engine.

Goods purchased at current City prices, and forwarded by Express, or as directed.

Commission, Five Per Cent.

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The Adams Express Company, appreciating the need of a capable medium connecting with the various Express Lines, through which personal and other orders for goods from this city, can be satisfactorily supplied, do recognize CARRINGTON & CO.'S PURCHASING AGENCY as such medium or filling orders for every description of goods wanted from New York, and commend it to the attention of the public, and of our general and local agents, recommending our agents to extend to it all reasonable aid, by facilitating the distribution of its cards and circulars, and making known the advantages it affords.

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The Greatest Improvement yt in the Sewing Machine Art!
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Please send for circular with sam ple of sewi.

These Improved Machines SAVE ONE HUNDRED PER CENT. of thread and silk, and make the LOCK-STITCH alike on both sides.
They require no instruction to operate perfectly, except "the printed directions."
No change in sewing from one kind of goods to another.
And no taking apart to clean or oil.
Our NEW MANUFACTORY is now complete, with all its machinery and tools entirely new, and is already rapidly turning out Machines which for BEAUTY and PERFECTION of FINISH are not surpassed by any manufacture in the world.
N. B.—Should any Machine prove unsatisfactory, it can be returned and money refunded.
Agents wanted in counties not canvassed by our own agents.
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No. 536 BROADWAY, NEW YORK

PUTNAM'S CLOTHES WRINGER.
IT IS THE ONLY RELIABLE
Self-Adjusting Wringer.
No Wood-work to Swell or Split. No Thumb-screws to get out of order. Warranted with or without Cog wheels.

It took the First Premium at Fifty-seven State and County Fairs in 1863, and nearly double that number in 1864, and is, without an exception, the *best* Wringer ever made. Patented in the United States, England, Canada, and Australia. Agents wanted in every town, and in all parts of the world. Energetic agents can make from $3 to $10 per day.

WHAT EVERYBODY KNOWS, VIZ.:
That Iron well galvanized *will not rust.*
That a *simple* machine is better than a complicated one.
That a Wringer should be *self-adjusting, durable, and efficient.*
That thumb-screws and fastenings cause *delay* and *trouble* to regulate and keep in order.
That wood soaked in water will *swell, shrink,* and *split.*
That wood-bearings for the shaft to run in *will wear out.*
That the Putnam Wringer, with or without cog-wheels, will *not tear the clothes.*
That cog-wheel regulators are not essential.
That the Putnam Wringer has *all* the advantages, and *not one* of the disadvantages above named.
That all who have tried it pronounce it the *best* Wringer ever made.
That it will wring a thread or a bed-quilt *without alteration*

We might fill the paper with testimonials, but insert only a few to convince the skeptical, such there be; and we say to all, *test* Putnam Wringer. Test it *thoroughly* with *any* and *a* others, and if not entirely satisfactory, return it.

PUTNAM MANUFACTURING CO.—*Gentlemen:* I know from practical experience that iron well galvanized with zinc will not oxydize or rust one particle. The Putnam Wringer is as near perfect as possible, and I can cheerfully recommend it to be the best in use. Respectfully yours,
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Many years' experience in the galvanizing business enables me to indorse the above statement in *all particulars.*
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PRICES—$8, $9, and $10.
Sample Wringers sent, express paid, on receipt of price.
Manufactured and sold, wholesale and retail, by
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Of the most reliable and approved construction manufactured and on hand at the
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This Meter combines
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REMARKABLE DURABILITY,
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Water Pipes, lined and coated with Cement mortar, ready for laying and back filling, and can be tapped like cast-iron pipes, which they excel in durability, discharge, and economy.
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NON-FREEZING & NON-EVAPORATING FLUID,
For Filling Wet Gas-meters,
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Far Cheaper than any other Meter-fluid in use.
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Not to corrode tin, iron, brass, zinc, or drum-metal.
To be less injurious to wet meters that water.
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The summer is the proper time to fill them.
SIX YEARS OF SUCCESS!
Five years in general use in works using it, to the exclusion of all other fluid, and driving the dry meter out of use, enables us to recommend our patent with perfect confidence.
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MANUFACTURERS OF
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FOR SALE
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4 Cast-iron round Purifiers, 4 feet 6 inches diamater, cast in one piece,—also grating and covers complete.

1. 4 inch Centre Seal.
1. 4 inch Condenser.
1. 12 inches by 9 feet Washer.
1. 30 inch Station Metre.

The above have been in use for some time, but are in good condition, and are now offered for sale through want of use.

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Now contract their works to make 10,000 feet of good Gas from 2,000 pounds of *hard* wood and 40 gallons of kerosene tar, *before payment can be demanded;* and the charcoal is worth the cost of the wood.

Many Village Gas Companies can be referred to.

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Estimates given for Gas-Works, Gas-Holders, or any Gas Apparatus.
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For sale, Parrish's Patent Gas and Air Mixer, adapted to all works using Petroleum or other oils, by which rich Petroleum Gas is mixed, after it leaves the holder, with a proper proportion of air, giving it the greatest illuminating power, without smoke, through any burners. The apparatus being attached to the outlet pipe, requires no alteration of the works.

Apply at the Gas-Works of St. Nicholas Hotel, No. 63 Mercer st., N. Y., where one can be seen in operation; or address D. Parrish, Jr., St. Nicholas Hotel, New York city, or No. 1416 Arch street, Philadelphia.

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SHUTTLE MACHINE!

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This Machine is constructed on entirely new principles of mechanism, possessing many rare and valuable improvements, having been examined by the most profound experts, and pronounced to be SIMPLICITY and PERFECTION COMBINED.

It has a straight needle, perpendicular action, makes the LOCK or SHUTTLE STITCH, which will NEITHER RIP nor RAVEL, and is alike on both sides; performs perfect sewing on every description of material, from Leather to the finest Nansook Muslin, with cotton, linen, or silk thread, from the coarsest to the finest numbers.

Having neither CAM nor COG WHEEL, and the least possible friction, it runs as smooth as glass, and is

PRICE OF MACHINES,
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No. 1, Family Machine, with Hemmer, Feller, Gauge, Braider, & Corder, complete - - - $65
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One-half hour's instructions is sufficient to enable any person to work this Machine to their entire satisfaction.

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GAS RETORTS, TILES and FIRE-BRICK of all shapes and sizes. FIRE MORTAR, CLAY, and SAND. Articles of every description made to order at the shortest notice. B. KREISCHER.

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WILLCOX & GIBBS SEWING MACHINE

It is entirely noiseless.
A patented device prevents it being turned backward.
The needle cannot be set wrong.
It received the Gold Medal of the American stitute in 1863.
Insend for a circular containing full information, notices from the press, testimonials from those using the machine, &c.

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THE UNDERSIGNED DESIRES TO undertake the supervision of several small Gas-works, to visit and examine them as often as may be necessary; to obtain and inspect their coal, castings, fire-brick, and other materials; and to manage their general business in such a manner that they shall be under such supervision as is now attainable in large works, at much increased cost. Also, to advise as general Consulting Engineer and expert in practical chemistry.

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154 Reade St.,
(Three doors from Greenwich St.,) NEW YORK,

Call universal attention to their

Kent's East India Coffee!

KENT'S EAST INDIA COFFEE

Has all the flavor of OLD GOVERNMENT JAVA, and is but half the price; and also that

KENT'S EAST INDIA COFFEE

has twice the strength of Java, or any other Coffee whatever and wherever used by our first-class hotels and steamboats—the stewards say there is a saving of 50 per cent.

KENT'S EAST INDIA COFFEE

is the most healthy beverage known, and is very nutritious. The weak and infirm may use it at all times with impunity. The wife of the Rev. W. Eaves, local minister of the M. E. Church, Jersey City, who has not been able to use any coffee for fifteen years, can use

KENT'S EAST INDIA COFFEE

three times a day without injury, it being entirely free from those properties that produce a nervous excitement.

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KENT'S EAST INDIA COFFEE.

I advise my patients to drink it universally, even those to whom I have hitherto prohibited the use of Coffee.

The PRINCIPAL OF THE NEW YORK EYE INFIRMARY says: "I direct all the patients of our Institution to use, exclusively,

KENT'S EAST INDIA COFFEE,

and would not be without it on any account.

The Rev. C. LARUE, an eminent clergyman of the M. E. Church, now stationed at Halsey street, Newark, says of

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"I have used it nearly a year in my family, and find it produces no ache of the head or nervous irritation as in the case of all other Coffees. It is exceedingly pleasant, and I cordially recommend it to all clergymen and their families."

KENT'S EAST INDIA COFFEE

is used daily by the families of Bishop Ames, Bishop Baker, Bishop James, and many of the most distinguished clergymen and professional men in the country."

Beware of Counterfeits!

and be sure that packages are labeled

KENT'S EAST INDIA COFFEE,
154 Reade Street, New York,

as there are numerous counterfeits afloat under the name of "Genuine East India Coffee," "Original East India Coffee," etc., put forth by imposters to deceive the unwary.

In 1 lb. packages, and in boxes of 36, 60, and 100 lbs, for Grocers and large Consumers. Sold by Grocers *generally.*

Orders from Country Grocers solicited, to whom a very liberal discount will be made.

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The Am. Adv. Agency, 308 Broadway, N. Y., will receive orders for the above named Coffee.

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"MAY THE BEST MAN WIN."

SAVE YOUR MONEY!

The Cheapest, most Delicious and Healthy Coffee in the World!!

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COFFEE
The most Healthy,
The most Economical,
The most delicious
PREPARATION OF COFFEE
IN THE WORLD,
OLD OR NEW.

This Coffee is prepared under a formula from the great German chemist,

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and gives the essential full strength and delicious flavor of OLD GOVERNMENT JAVA COFFEE, which is the only quality of Coffee used in its preparation, without any of that narcotic quality which so sadly damages the nervous system in the use of even the best grades of Coffee as ordinarily prepared.

2d. It gives the essential tonic and diuretic elements of Dandelion, without the "hereby," coarse taste so disgusting, and yet always found in the ordinary Dandelion Coffee.

It is known to all acquainted with chemistry, that the essence, or oil, or whatever name may be given it, when properly and scientifically obtained from any herb or plant, is a far different article from that produced by putting that plant into water and boiling it out—permitting the escape of the most exquisite and reliable strength and leaving the coarse and earthy drugs precipitated or in solution.

So this preparation combines the exquisite aroma of the Java Coffee, with the highest essential excellence of the most choice Dandelion—yielding the spirit without the grosser earthy body of both; thereby avoiding the deleterious effects of both and becoming at the same time

The most Delicious Beverage
AND THE
Most Health-giving and Restoring Drink

Known in the world—being at once a sovereign remedy instead of producer of

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Flatulence, Fulness of the Head,
Dizziness, Costiveness, and
diseases of the Liver
and Kidneys,

because of its great Tonic and Diuretic qualities.

The simple fact that the preparation is from Baron Leibig, will commend it to the attention of the scientific in all parts of the country, while the use of it will at once and permanently prove to the masses everywhere that it is the long-needed desideratum—in its way.

The immense popularity of this Coffee in the Old World is an earnest that its use and popularity in America is bound to become continent wide.

Another consideration not to be overlooked in regard to the matter, is that

It Costs Less than Ordinary Green Coffee.

And requires less than half the quantity to give the same degree of strength, and its use proves it at 30 cents a pound to be cheaper than Maricaibo coffee at 15 cents a pound.

Neatly packed in pound papers, with full instructions for use on each label—in SIXTY POUND BOXES. Price, 30 cents per pound. A liberal discount to the trade.

Manufactured by the PEOPLE'S PROVISION CO., 268 Greenwich street, N. Y., to whom all orders may be addressed.

Sold by wholesale Grocers and Druggists.

Glycerin for Gas Meters.

This article is superior to any fluid ever before used for Wet Meters, and we cannot better set forth its advantages than by giving the following letter from the Superintendent of the Covington Gas Co. The superiority of our Glycerin over all others in the market, for this purpose, is admitted by every Company that has used it. We have sold, the past winter, to the Cincinnati Gas-Light and Coke Co; to the Gas Companies of Covington, Ky.; Dayton, Springfield, Portsmouth, Urbana, and Piqua, Ohio Richmond, Ind., and Buffalo, N. Y, to whom we refer.

Glycerin is much cheaper than Whisky is now, or likely to be hereafter, and not evaporating, greatly increases the economy of its use.

OFFICE OF THE COVINGTON GAS-LIGHT CO.
COVINGTON, KY., Feb. 18, 1864.

MESSRS. W. J. M. GORDON & CO.:

Dear Sirs,—It affords us great pleasure in testifying to the superiority of the Glycerin Fluid purchased from you for filling the Wet Meters now in use by the Covington Gas-Light Company.

The difficulty of finding a non-evaporating and anti-freezing mixture for Wet Meters, has, in my opinion, been overcome by the use of your Glycerin Fluid.

I have had it in constant use for the past four months, and during that period the thermometer has ranged as low as 14° below zero, and after careful examination, I have found the fluid in the same condition as when first put in the Meters, and without the slightest discoloration.

Its non-evaporating quality does away with the hitherto unavoidable expense of filling the Meters monthly, and renders Wet Meters no longer objectionable.

In fact, I can cheerfully recommend it as being cheaper and better than any other Fluid or Mixture now in use.

Very respectfully,
S. S. STRATTON, *Sup't Cov. Gas Co.*

We have been engaged in Manufacturing Glycerin the past six years, and from our advantage in material and the large amount we make, are enabled to offer it lower than any manufacturer in this country. We will be pleased to quote prices or to give further information.

W. J. M. GORDON & BRO.,
MANUFACTURING
CHEMISTS & DRUGGISTS,
N. E. Cor. Central Avenue & Eighth St.,
Laboratory, Miami Canal, bet. Third & Fifth Sts.,
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OF THE
OIL REGIONS.

The extraordinary developments of the last few years have rendered indispensable to the community, A NEW AND RELIABLE map of that portion of Pennsylvania, known as the OIL REGIONS. And such a Map, in the form of an Atlas, made from actual surveys of the whole territory (and the only surveys that have been made in the territory,) is now being prepared for publication by the undersigned, to which your special attention is invited. In will embrace the whole of VENANGO and portions of CRAWFORD and WARREN Counties, and is designed to be the most complete and perfect work of the kind ever published, showing distinctly—

1 A general map of Venango and parts of Warren and Crawford counties, Penn., and enlarged plans of each township.

2 All the original lot lines.

3 All subsequent subdivisions of lots in the oil districts, with the names of present owners or lessees.

4 All the Roads, Rivers and Creeks accurately delineated.

5 All Dwellings, Factories, Mills, Refineries, and Shops of every description.

6 Enlarged plans of all important Towns and Villages.

7 Enlarged plans of all the oil lands on Aleghany River, Oil Creek, French, Pithole, Tionesta, Hemlock and Tidelute Creeks, Cherry and Cherry Tree Runs, and all other Creeks and Runs on which discoveries of oil have been made.

8 Location and brief description of the property of all the principal Oil Companies.

9 Location and names of all the Oil Wells in the Territory.

10 A brief history of the Oil Business, from its first discovery to the present time, with valuable statistical information, making a volume of some fifty pages, about 15x18 inches, substantially bound.

A limited number of business cards pertaining to the production or sale of oil, or oil territory, will be received, and if early application be made, parties may have views of their establishments, or wells, with brief notices of the same, inserted.

The surveys for the Atlas are completed, and the proprietors intend to have it ready for delivery to subscribers (only) by about the 1st of January next.

All persons or firms desiring the work are requested to send their names as subscribers to the undersigned before the 1st of December, and designate the number of copies wanted, and the place where they wish them delivered.

F. W. BEERS & CO
43 John St., New York,
or Franklin, Penn.

Franklin, Penn, Oct. 20, 1864.

New York, April 18th, 1864.

* * * * * *

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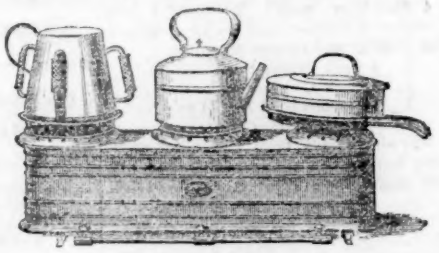

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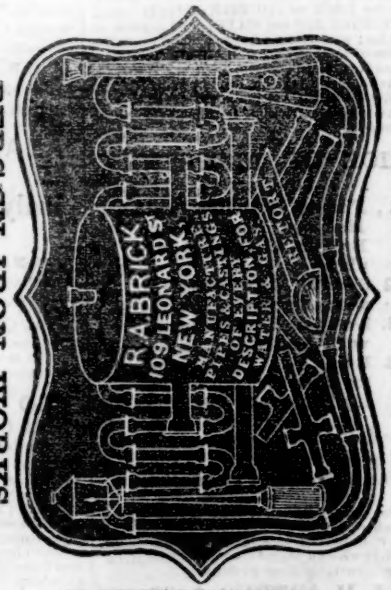

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